



378.771
Oh3
Zh
v.6

BOOK 378.771.OH3 ZH v.6 c.1
OHIO # HISTORY OF OHIO STATE
UNIVERSITY

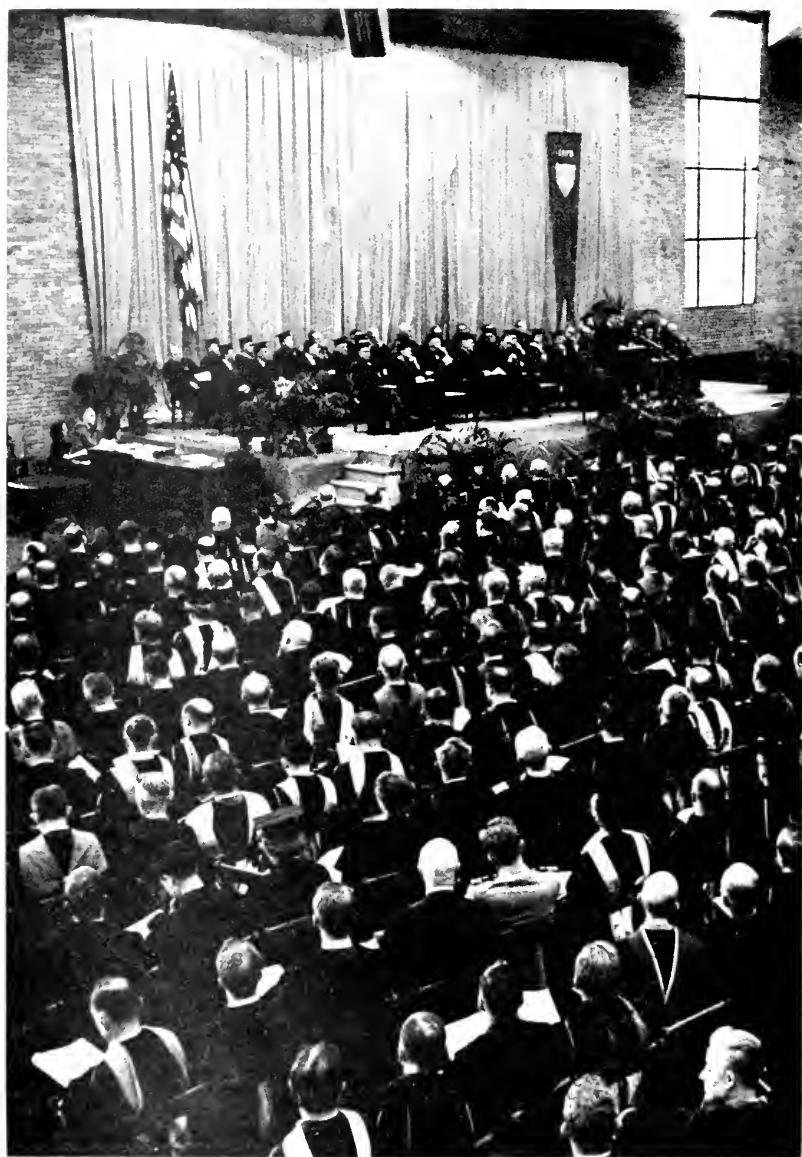


3 9153 00120583 2

RECEIVED

DEC 29 1953

HISTORY OF
THE OHIO STATE UNIVERSITY
VOLUME VI



THE CONVOCATION

ADDRESSES AND PROCEEDINGS
OF
THE SEVENTY-FIFTH
ANNIVERSARY
1948-49

Growth through Service

THE OHIO STATE UNIVERSITY PRESS
COLUMBUS
1951

578 7.11

613

71

16

COPYRIGHT, 1951 BY
THE OHIO STATE UNIVERSITY

FOREWORD

The Seventy-fifth Anniversary celebration of The Ohio State University began with a two-day University-wide celebration on October 14 and 15, 1948, and continued throughout the school year with some sixty-nine special observances by the various colleges, schools, departments and other divisions of the University. Although the University was established in 1870, it opened its doors to students on September 17, 1873; hence the selection of this year for the celebration.

A general anniversary committee was responsible for the over-all planning. Vice-President Harlan H. Hatcher was chairman of this committee and James F. Fullington, chairman of the Department of English, was executive director of the celebration.

There were a number of other committees responsible for different portions of the celebration. Persons from many areas in the University, including some in retirement, served on these committees. For example, Edith D. Cockins, Registrar Emeritus, made a memorable contribution in handling arrangements for the Seventy-fifth Anniversary Dinner, which was held at the Neil House on October 15. The Board of Trustees, the faculty, the student body, and many friends of the University co-operated loyally and effectively.

The theme of the year-long celebration was expressed in the motto, "Growth through Service." The various observances brought many distinguished scholars, scientists, administrators, and educators to the campus. The University found an opportunity to appraise its past and present, and to examine critically its plans for continued service.

The present volume contains the addresses delivered at the general University-wide celebration on October 14-15, and at the program held in connection with the annual meeting of The Ohio State University Research Foundation on November 4. Of the other events held during the year, some were specially planned for the anniversary, and some were annual events which gave special recognition to the University's birthday. Only a few of the highlights of the year can be recounted here.

The work of the University was brought to the attention of thou-

sands of people through newspaper and magazine articles and local and national radio programs. The University's radio station WOSU broadcasted many of the addresses given during the program on October 14-15 and at other events. The Columbia Broadcasting System carried a portion of the address by Karl T. Compton at the Anniversary Banquet. The history of the University was the subject for a state-wide broadcast entitled, "The Broad-Gauge University," carried by ten Ohio stations on October 15, 1949. And there were others as the year went forward.

Among the special observances were those of the College of Engineering on January 24, and the College of Agriculture on March 22-25. These are the two original colleges of the University, now grown to ten colleges and a Graduate School. The celebration of the College of Agriculture was made a part of the annual Farm and Home Week, an event which attracted more than ten thousand persons to the campus. A Women's Institute, March 21-23, brought outstanding leaders in women's activities throughout Ohio to the campus to consider ways of serving Ohio communities. The College of Commerce and Administration held nine conferences and institutes for business groups during the year.

Other special anniversary celebrations included those of the Department of Chemistry on November 19-20; the College of Medicine, December 6-11; the University Religious Council, February 6 and 20; the College of Education, April 20-21; the College of Law, May 6-7; the College of Pharmacy, May 11-13; and the School of Nursing, June 13-17.

A number of national meetings came to the campus during the year. Four national mathematics groups—the American Mathematical Society, the Mathematical Association of America, the Association for Symbolic Logic, and the National Council of Mathematics Teachers—met on December 27-30. Other national meetings were those of the National Academy of Cleft Palate Prothesis, March 21-22; the American Association of Collegiate Registrars, April 25-28; the American Philosophical Association, April 28-30; the Institute for Education by Radio, May 6-7; the American Association for Adult Education, May 9-11; and the Institute of Accounting, May 20-21.

The year was notable also for significant progress in the University's new building program. Hughes Hall was dedicated as the new home of the School of Music on June 4; graduates of the University, returning for Alumni Day, participated in the ceremonies. Breaking ground for the addition to Hagerty Hall took place at a brief ceremony on November 5.

Students and faculty received their first glimpse of the new Student Union building plans at an "unveiling" in University Hall auditorium on January 19. Groundbreaking for the addition to the Main Library, later to be known as the William Oxley Thompson Memorial Library, was marked by a ceremony on May 9. These were all significant parts in the launching of a building program which eventually would add to the physical plant ten new structures and additions to three other buildings. It was appropriate that they should come during the anniversary year.

In addition to marking an anniversary for the University, the year saw the completion of college training for a record number of veterans of World War II, who four years previously had swelled the enrollment to a new high. At the June, 1949 commencement exercises in Ohio Stadium, 2,457 graduates received diplomas, a new high. For the year, the total was 5,567. The seventy-five thousandth graduate of the University was a member of the June class.

WILLIAM G. WILCOX

CONTENTS

PART I

THE GENERAL UNIVERSITY CELEBRATION

	<i>Page</i>
THE PROGRAM.....	3
THE CONVOCATION	9
Invocation, The Reverend Boynton Merrill.....	11
Opening Remarks, Howard L. Bevis.....	12
Greetings	
Governor Thomas J. Herbert.....	15
H. E. Simmons.....	16
William A. Dougherty.....	17
Leslie R. Forney, Jr.....	19
H. Gordon Hullfish.....	20
Address, James Lewis Morrill.....	23
Address, Howard L. Bevis.....	32
THE FIRST CONFERENCE.....	41
Opening Remarks, Charles E. MacQuigg.....	42
Address, Charles F. Kettering.....	44
Address, Cornelius Krusé.....	52
THE SECOND CONFERENCE.....	67
Opening Remarks, Jefferson B. Fordham.....	68
Address, Robert Lawrence Stearns.....	71
Address, W. W. Waymack.....	83

	<i>Page</i>
THE THIRD CONFERENCE.....	97
Opening Remarks, Gordon Keith Chalmers.....	98
Address, Mildred McAfee Horton.....	100
Address, Reinhold Niebuhr.....	110
THE SEVENTY-FIFTH ANNIVERSARY DINNER.....	125
Opening Remarks, Harlan H. Hatcher.....	126
Responses	
Carl W. Weygandt.....	128
John B. Fullen.....	129
James J. Hurley.....	131
Ramon Gual.....	133
Greetings from the Board of Trustees, Donald C. Power.....	135
Address, Karl Taylor Compton.....	138
Concluding Remarks, Howard L. Bevis.....	152
DELEGATES AND REPRESENTATIVES.....	153
From Colleges and Universities.....	154
From Societies and Associations.....	157
From Student Organizations.....	158

PART II

THE PROGRAM OF THE OHIO STATE UNIVERSITY RESEARCH FOUNDATION

Opening Remarks, Howard L. Bevis.....	162
Address, Major General Anthony C. McAuliffe.....	166
Address, E. C. Bain.....	179
Address, Hugh S. Taylor.....	189

PART I
THE GENERAL UNIVERSITY
CELEBRATION

October 14-15, 1948

PROGRAM COMMEMORATING THE SEVENTY-FIFTH
ANNIVERSARY OF THE OPENING OF CLASSES

COLUMBUS
OCTOBER FOURTEENTH AND FIFTEENTH
NINETEEN HUNDRED AND FORTY - EIGHT

THE ACADEMIC PROCESSION

Thursday, October fourteenth

2:15-2:30 P.M.

THE MARSHALS

THE PRESIDENT OF THE UNIVERSITY AND THE GOVERNOR OF OHIO

THE SPEAKERS

THE TRUSTEES OF THE UNIVERSITY

THE ADMINISTRATIVE OFFICERS OF THE UNIVERSITY

THE DEANS

THE DELEGATES FROM THE COLLEGES AND UNIVERSITIES

THE DELEGATES FROM SOCIETIES AND ASSOCIATIONS
FOR THE ADVANCEMENT OF LEARNING

THE UNIVERSITY FACULTY

THE REPRESENTATIVES OF STUDENT ORGANIZATIONS

▲ ▲ ▲

THE CONVOCATION

Thursday, October fourteenth—2:30 P.M.

The Physical Education Building

MUSICAL PRELUDE.....2:00-2:30 P.M.

THE UNIVERSITY CONCERT BAND

MANLEY R. WHITCOMB, Conductor

Trumpet Tune.....Henry Purcell

Sarabande.....J. S. Bach

Gavotte.....G. F. Handel

Aria.....A. F. Tenaglia

Psalm XVIII.....Marcello

American Folk Rhapsody.....Grundman

Overture "Tircis".....Senec

PROCESSIONAL

Coronation March from "The Prophet".....Meyerbeer

INVOCATION

THE REVEREND BOYNTON MERRILL

FOR THE STATE OF OHIO

THOMAS J. HERBERT, Governor

FOR THE COLLEGES OF OHIO

H. E. SIMMONS, President, The University of Akron, and President,
the Ohio College Association

FOR THE ALUMNI

WILLIAM A. DOUGHERTY, President, the Ohio State University
Association

FOR THE STUDENT BODY

LESLIE R. FORNEY, JR., President, the Student Senate

FOR THE FACULTY

H. GORDON HULLFISH, Member, the Conference Committee of the
Teaching Staff

MUSIC

THE UNIVERSITY SYMPHONIC CHOIR

LOUIS H. DIERCKS, Conductor

The Spires.....Christiansen

Diffusa est Gratia.....Nanani-Diercks

Be as a Lion (Merry Mount).....Howard Hansen

ADDRESS—"New Occasions and New Duties"

JAMES LEWIS MORRILL, President, the University of Minnesota, and
President, the Association of Land-Grant Colleges and Universities

ADDRESS—"Our Diamond Jubilee"

HOWARD L. BEVIS, President, The Ohio State University

RECESSIONAL

Marche Militaire "Francaise".....Saint-Saëns

THE CONFERENCES

The University Hall Chapel

Thursday, October Fourteenth—8 P.M.

Presiding: CHARLES E. MACQUIGG, Dean, the College of Engineering
“Science and Technology—Servants of Man”

CHARLES F. KETTERING, Vice President and Director, the General
Motors Corporation

“Humanity’s Need for the Humanities”

CORNELIUS KRUSÉ, William Griffin Professor of Philosophy, Wesleyan
University, and formerly Director, the American Council of Learned
Societies

Friday, October Fifteenth—10 A.M.

Presiding: JEFFERSON B. FORDHAM, Dean, the College of Law

“The State University—A Service to Democracy”

ROBERT LAWRENCE STEARNS, President, the University of Colorado

“Education for Survival”

W. W. WAYMACK, Member, the United States Atomic Energy
Commission

Friday, October Fifteenth—2 P.M.

Presiding: GORDON KEITH CHALMERS, President, Kenyon College

“Living with Our Human Relations”

MILDRED MCAFEE HORTON, President, Wellesley College

“Our Pilgrimage from a Century of Hope to a Century of Perplexity”

REINHOLD NIEBUHR, Professor of Applied Christianity, Union
Theological Seminary

THE PRESIDENT’S LUNCHEON

For Delegates and Invited Guests

Friday, October fifteenth—12:00
The Faculty Club

THE SEVENTY-FIFTH ANNIVERSARY DINNER

Friday, October fifteenth—7 P. M.

The Neil House

MUSICAL PRELUDE

THE UNIVERSITY SALON ORCHESTRA

GEORGE E. HARDESTY, Conductor

Turkish March.....Beethoven

Valse Lento from "Sylvia" Ballet.....Delibes

Faust Ballet Suite.....Gounod

AriosoBach

Roumanian Folk Dances.....Bartók

THE TOASTMASTER

HARLAN HATCHER, Vice-President, The Ohio State University

RESPONSES

CARL V. WEYGANDT, Chief Justice of the Supreme Court, the State of Ohio

JOHN B. FULLEN, Secretary, the Ohio State University Association

JAMES J. HURLEY, Consul, the Dominion of Canada

RAMON GUAL, Consul, the Republic of Mexico

GREETINGS FROM THE BOARD OF TRUSTEES

MUSIC

THE UNIVERSITY MEN'S GLEE CLUB

DALE V. GILLILAND, Conductor

Feasting I Watch.....Elgar

Voix Celestes.....Alcock-Strickling

Song of the Wanderlust.....McCullum

Ole Ark's a-Moverin.....Cain

ADDRESS—"Science and Security"

KARL TAYLOR COMPTON, President, the Massachusetts Institute of Technology

CONCLUDING REMARKS

HOWARD L. BEVIS, President, The Ohio State University

"CARMEN OHIO"

THE CONVOCATION

Presiding Officer:

HOWARD L. BEVIS, President, The Ohio State University

The Invocation:

THE REVEREND BOYNTON MERRILL, Minister, First Congregational Church, Columbus

Speakers:

THE HONORABLE THOMAS J. HERBERT, Governor of Ohio

H. E. SIMMONS, President, the University of Akron, and President, the Ohio College Association

WILLIAM A. DOUGHERTY, President, the Ohio State University Association

LESLIE R. FORNEY, JR., President, the Student Senate

H. GORDON HULLFISH, The Conference Committee of the Teaching Staff

JAMES LEWIS MORRILL, President, the University of Minnesota, and President, the American Association of Land-Grant Colleges and Universities

HOWARD L. BEVIS, President, The Ohio State University

INVOCATION

By the REVEREND BOYNTON MERRILL

O THOU who art the author and sustainer of all created things, we invoke Thy presence. So long Thy love and wisdom have led us; sure they still will lead us on.

Age after age, the living wait upon Thee and stand before Thy wondrous world and find that of Thy renewing power there is no end. Before ever Thou hadst breathed into the dust of the earth the breath of life, Thou hadst decreed that knowledge should grow from more to more and that the truth should break over us like morning. For the slow unveiling of Thy wisdom, the revelation of Thy will and power, we do now praise Thee.

Grant unto us who stand in the great succession of those who have set their pilgrim feet to walk in the paths which lead toward wisdom—grant unto us, we pray Thee, ever to confront Thy mysterious universe with wondering and eager minds, and ever to confront Thee with humble hearts. Help us to know that even at our best we do but think Thy thoughts after Thee.

And now, we ask Thy continued blessing upon this institution of learning; preserve and greaten it over many years. We bless Thee that from small beginnings a great thing has come amongst us, set here in our midst to discern and to preserve the truth, to unveil and lift up the beautiful, and so to shed light upon our human life that man shall find it good and rejoice in it.

We recall, gratefully, faithful teachers and gifted leaders of other days. We rejoice in the long procession of students, men and women who have here labored, not only to unlock the secrets of the world about them, but to discover and release powers within themselves, mysteriously given unto them by Thee.

And now we would commit these days of memorial and all the unknown future unto Thee, praying that all who are here concerned with the high pursuit of knowledge and with the getting of wisdom may find all their paths leading unto Thee who art above all high things, the Highest. Amen.

OPENING REMARKS

By HOWARD L. BEVIS

AS A BACKGROUND for the discussion which will be heard on this campus in the opening phase of our seventy-fifth anniversary celebration, I should like to make two observations. The first concerns the following headlines: Pope Pius Deplores War, Asks Liberal Policy; Germans Seek United Nation; French Elections Watched; Marxism Called a Menace; Russian Troops Occupy Hungary; Czechs' Independence Hopes Crushed, Leaders Sent to Prison Camps; Population Weakened by Hunger; and Displaced Persons Seek Homes. The fact that I could document these headlines as of one hundred years ago may well give us courage. World events which now seem so shattering have long been foreshadowed in human history, and in some way or other, solutions have been found for the problems raised. The second observation I should like to make may be less reassuring. It has to do with a statement quoted by former President Elliott of Purdue University to this effect: "The human mind changes less rapidly than the events controlled by it." Colleges and universities are primarily concerned with the human mind, and the challenge is clear: Can the institutions of learning prepare the minds entrusted to their guidance to work out current solutions for the problems raised by these headlines?

We are pleased and honored that you have taken time from your busy lives to attend our celebration, and we welcome one and all to our tents. As you have doubtless noted, the events of these two days are the beginning of a more protracted celebration of our birthday which will extend throughout the college year. Individual colleges, departments, and schools will from time to time bring their friends together for observances in keeping with their respective endeavors. To compress them all into one big event would be manifestly impossible.

This is The Ohio State University and its immediate constituency is the people of Ohio. We like to believe, however, that our endeavors extend beyond our own borders. Indeed, the presence of many of

you attests our faith in far-flung friendships. Yesterday I received a letter from Sam Higginbottom, known to many of you as the apostle of better agriculture in India. Sam Higginbottom received his training in agriculture at The Ohio State University, and we are happy to have in our student body a considerable number of students from India who have come here in response to his influence. May I quote a sentence or two from his letter:

I thank God for The Ohio State University. This bond between the United States and India means much as a builder of international good will. As the University is rejoicing over its ever-expanding service to humanity in Ohio, in the United States, in the lands beyond the seas, I will be with you in spirit. In memory, I will walk once again the old familiar paths. I will take the shoes from off my feet, for wherever I tread, the ground will be holy.

It is now my pleasure to present to you a series of speakers who bring you greetings: for the State of Ohio, the Honorable Thomas J. Herbert, Governor; for the colleges of Ohio, H. E. Simmons, president of the University of Akron and of the Ohio College Association; for the alumni, William A. Dougherty, president of the Ohio State University Association; for the student body, Leslie R. Forney, Jr., president of the Student Senate; and for the faculty, H. Gordon Hullfish who will present a communication from the Conference Committee of the Teaching Staff.

The introduction of the principal speaker of the afternoon, J. Lewis Morrill, is a peculiar pleasure. He comes to us today to speak as the head of the Association of Land-Grant Colleges and Universities, one of the greatest, most powerful educational organizations in America. We are doubly honored that he is here also in his capacity as president of one of the greatest universities in the country, with a student body of more than twenty-seven thousand.

We are especially thankful that he can be here because he is one of our very own. He attended The Ohio State University and took his degrees here; he became secretary to our alumni association, which under his management grew and prospered greatly. He was the University's first vice-president. He left us to become president of the

University of Wyoming, and is now president of the University of Minnesota.

Throughout all of these steps in his career, he has been an earnest and effective worker in the cause of publicly supported higher education. The subject of his address will be "New Occasions and New Duties."

GREETINGS, FOR THE STATE OF OHIO

By GOVERNOR THOMAS J. HERBERT

JUST as members of the University family are proud, all Ohio citizens are rightfully proud of the progress and the achievements of this great institution. In the light of history, seventy-five years is not a very long period, but in that relatively brief span The Ohio State University has grown from a small agricultural and mechanical college to one of the large universities of the world.

The development of The Ohio State University is a tribute to the vision, courage, resourcefulness, and tenacity of the valiant men who gave the best years of their lives to promote a great ideal. In the larger sense, however, the greatness of this institution is a tribute to the wisdom of the people of Ohio, because in the long run the University belongs to all of the citizens of our state. This inspiring pageant of progress is basically a tribute to the principles of practical democracy.

A statistical recitation of the size and scope of The Ohio State University is almost overwhelming. We have here one of the greatest educational, research, and service agencies in the world, with twenty-three thousand, seven hundred students and a physical plant valued at more than thirty million dollars. However, the significance of our University cannot be stated in physical and statistical terms. The real measure of this institution lies in its contribution to the enrichment of the lives of our citizens.

This afternoon we are observing seventy-five years of progress. At the same time we are dedicating ourselves to the idea that the University is now on the verge of its greatest usefulness. The vast expansion program which is now under way, the addition of splendid men and women to our faculty and administrative staff, and the growing influence of the entire institution through radio and other means signify a future of even greater achievement. In co-operation with the people of Ohio and with the representatives of those people in the state government, the University can look forward to a future of even greater significance in the service of all mankind.

GREETINGS, FOR THE COLLEGES OF OHIO

By H. E. SIMMONS

I BRING greetings to this Diamond Jubilee celebration from the Ohio College Association, which will soon be holding its seventy-eighth annual meeting. Prior to 1870, when this state University was founded, there were sixty-one colleges and universities chartered in Ohio, twenty-four of which are still in operation. In the decade between 1870 and 1880, eight colleges, including Ohio State, received charters. In 1870, there were more colleges and universities in this state than in any other state in the Union, Pennsylvania coming second.

The total scientific equipment possessed by all of the colleges in the state in 1870 would not have been sufficient to satisfy the needs of one modern institution. The total library holdings would have made only a modest collection for a first-rate college. Yet, out of these colleges came leaders in many fields of knowledge. In spite of the limited facilities in those early years, there was, it seems to me, a greater emphasis upon the acquiring of wisdom through the educational process than we find in our present greatly expanded programs. Today the world needs more wisdom, in order to cope with the products of our extensive educational developments.

If the observation is correct, that more wisdom was transmitted to students in the latter part of the nineteenth century than today, is it fair to call attention to the fact that a large percentage of our students in the early period were attending church-affiliated colleges? Of the forty-two universities and colleges enrolled in 1948 in the Ohio College Association, eight are known as public institutions. Significantly, these eight institutions educate 60 per cent of all the college students in the state. In our effort to train students to make a living, have our public insitutions forgotten to emphasize the importance of learning how to live?

Therefore, on the occasion of the Diamond Jubilee of this great University, we pray that those who administer and those who teach be mindful that wisdom is the principal goal.

GREETINGS, FOR THE ALUMNI

By WILLIAM A. DOUGHERTY

IT is my high privilege to bring to The Ohio State University the heartfelt felicitations of those thousands of men and women who spent student days on this campus. Although they are scattered all over the world, their steadfast loyalty to our alma mater is unified through our alumni association. I am told that there was a time when the *genus alumnus*, interested only in victorious athletic teams, was considered an unavoidable by-product of the educational process. Happily, that situation has been changed by participation of alumni in the broader aspects of higher education. The distinguished place which The Ohio State University has won is in a considerable measure due to the effective and devoted interest of our alumni over the years. Not only is their official organization, the Ohio State University Association, the third largest in membership, but it is also one of the most soundly organized and carefully integrated organizations of its kind in the country. Its Development Fund has risen in nine short years to be one of the largest alumni funds in the country. For several years, this fund has stood fourth or fifth in the amount of money raised and in total number of givers. Many friends of the University, in addition to alumni and former students, have contributed to the total.

This money-raising effort is based on the premise that, while the General Assembly can be expected always to provide the bread-and-butter needs of the institution, the refinements that really make a university great can be provided by alumni and friends. The adornments that you see on this campus are illustrations. These include the monumental gateway at Fifteenth and High, the bubbling fountain at Mirror Lake, the Stadium (which is one of the most beautiful structures in the world), the clock in University Hall tower, the chimes that ring out daily from Orton Hall. Alumni gifts furnished beautiful Pomerene Hall and the Ohio Union after the legislature appropriated the moneys to build them. But the encouragement that has been given to a devoted faculty and to bright young students has meant much more than these adornments. Our brilliant research men

have been provided the tools with which to further their work. Such instrumentalities as the cyclotron, betatron, Van de Graaff generator, and electron microscope have been furnished by means of these gifts. Financial assistance at the right time helped to make possible our famous Recognition Work for the armed forces during the war, as well as to build the finest cryogenic laboratory in the world. Cobalt 60, for use in the treatment of cancer, was announced to the world last spring from this campus, partly as the result of assistance to researchers from the Development Fund. We have added scores of new scholarship and fellowship funds for students and we have increased the loan funds available by more than one hundred thousand dollars through the Student Loan Foundation and Development Fund.

The University is a concentration of many forces—an integrated whole made up of administration, faculty, students, alumni. As an integral part of this whole, the alumni of The Ohio State University pledge to you, President Bevis, and to your successors in office, an ever-increasing measure of assistance and devotion. The Ohio State University is now one of the recognized giants of higher education. Our objective is to continue to provide the faith and the works which will make it the very best university of all.

GREETINGS, FOR THE STUDENT BODY

By LESLIE R. FORNEY, JR.

I BRING to you today the greetings of the student body. We, the students, are very proud of our University—proud, not that it is seventy-five years old, but proud of what has been accomplished during those seventy-five years. It is said that a university must be judged by its graduates. On that score, Ohio State stands among the greatest, for the men and women who have preceded us here have filled well their places in the world. We are proud, too, of the future of our University, for as we walk along the campus every day, we can see its facilities being improved and expanded, and we know that ever-new doors are being opened for service to the nation, the state, and the community. We feel sure that the one-hundredth anniversary will be more glorious than the seventy-fifth.

But as students, our primary interest lies in what the University is doing today and what it is doing for us. The present student body is unique in the history of the University. There are students who have seen the bloodshed and the wreckage of the far-flung battle fronts of the last war, and there are those who have just left their homes in Ohio cities and towns. But we all face the same terrifying problem—that of preparing ourselves for life in this sorely troubled world.

President Bevis said last year that the goals of educational policy are threefold: first, to prepare the student for occupational competence; second, to prepare the student for effective citizenship; and third, to prepare the student to lead a good and satisfying personal life. We know that Ohio State has given us that preparation.

The University has faced a difficult job in the postwar period, but that job has been mastered; we are proud of the University's accomplishments. Therefore, as a representative of the more than twenty-four thousand students, it gives me the greatest pleasure to extend to you our welcome on this seventy-fifth anniversary of The Ohio State University.

GREETINGS, FOR THE FACULTY

By H. GORDON HULLFISH

On Behalf of the Conference Committee of the
Teaching Staff

IT is my privilege to be here as a representative of the Conference Committee of the Teaching Staff. This Committee is itself representative of the faculty of The Ohio State University in all of its ranks. In this capacity, I have the honor to read the following communication to President Bevis.

Our seventy-fifth anniversary occurs at a time when many in the world question the purpose that underlies greatness at the university level—the full, free, and fair exploration of ideas. It is proper, therefore, that the faculty of The Ohio State University should take stock at this time of its opportunities and its responsibilities. Self-appraisal is a first step toward surety in future growth.

During its seventy-five years The Ohio State University has served the people of Ohio, and of the nation, with distinction. An historian would take note of the development of specific programs and colleges, of the growth of graduate work, of the growing roster of distinguished research workers and teachers, of the general responsiveness of the institution to the needs of the state that sustains it, and of the administrative conception which has guided it.

The Ohio State University is a human institution and, as such, has had moments of weakness and difficulty. Renewed strength, however, has been the consequence of its adversity. That strength is with us today. It may be observed in the wholesome atmosphere that encourages the responsible teacher in his appropriate work—the freedom to discover, and to express, the larger significance of the ideas with which he deals. It may be seen, too, in our established practices of tenure, in the representative character of the University Faculty Council, in the impact of this body upon policy and practice, and in the procedures followed in the selection of administrative officers and staff members.

We have an honorable tradition on which to build as we move into the final quarter of our first century. This tradition is clearly the consequence of an administrative policy that has been generally sensitive to

the values basic to the creation and maintenance of greatness in an institution of higher learning. The policy has involved the faculty responsibly in contributing to the growth of The Ohio State University. It has provided the proper measures of freedom and responsibility within which the faculty has been able to conduct research and examine ideas in the classroom so that the bounds of knowledge may be progressively extended.

It is good to be a part of an institution that comes to this anniversary year so fortified. Our times call out for greatness. The problems men now confront, the problems to which our best and most devoted intelligence must now be turned, arise from tensions and uncertainties in the field of human relationships. These problems can be solved only as fact is substituted for prejudice, as truth replaces dogma. Our present responsibility is clear. We are called upon to seek knowledge and understanding in the field of human relations with the same vigor that has been characteristic of our search in the technical fields.

The challenge before us arises from the distinctive need of our people, the need to understand the social consequences of knowledge as this is gained. It will not be easy to meet this challenge. Some will say we should not try. We reject this as unworthy of a great university. Knowledge comes to full fruition as it illuminates the lives of men. A university comes into its rightful heritage as it helps men live examined lives.

There are, then, certain quite specific tasks before us today. We shall need to stand firm administratively to our historical commitment, that the life of a university is uniquely a life in which the free interplay of idea upon idea is highly prized. *This is the distinctive democratic commitment.* No fascist or communist state dare make it. We shall need, further, to stand firm as a faculty on the base of responsible action. We must not relay dogma to the student nor sabotage intellectual freedom. We have the charge, rather, to conduct research with integrity and to present conclusions and opinions to students with honesty, clarity, and courage.

Finally, we shall need to work unceasingly at the task of bringing to the student a realization of what he ought to expect from the institution that serves him. Our students are entitled to a responsibly planned and conducted intellectual life. They are entitled equally, in the classroom and on the campus generally, to experiences in which they may learn, under the condition of a shared and critical intelligence, the techniques and attitudes appropriate to democratic growth and development.

This effort to take stock of ourselves has been rewarding. Our past, Mr. President, promises a healthful future. Within it we find a commit-

ment to the building of a free civilization. We pledge ourselves anew to this commitment. We are confident that The Ohio State University, by maintaining the humane atmosphere in which intellectual growth is nourished, will continue to grow within the pattern of greatness its past has foreshadowed. It will, thus, continue to serve the people of Ohio as a democratic people should be served.

Very respectfully yours,

RICHARD H. BAKER
RODERICK BARDEN
JAMES D. CALDERWOOD
EDGAR DALE
WELLS L. DAVIS
VIRGIL HINSHAW, JR.
H. GORDON HULLFISH

ROBERT E. MATHEWS
ROBERT D. PATTON
HOYT L. SHERMAN
LEO G. STALEY
WILBUR M. TIDD
FRANK H. VERHOEK
ARTHUR WIRTH

JORGEN M. BIRKELAND, *Chairman*

The Conference Committee of the Teaching Staff

NEW OCCASIONS AND NEW DUTIES

By JAMES LEWIS MORRILL

FROM the northland of Paul Bunyan and his famed Blue Ox, I bring you greetings! Gargantuan greetings and the admiring felicitations of a sister university. Anniversaries are heartening occasions. They give friends the welcome opportunity to say "Happy birthday." They afford the occasion to look backward and proudly to take stock of great accomplishment. Better still, they stimulate a look ahead, offering the encouragement and confidence that come from past performance.

It is a long way from Ohio to Minnesota; yet for me the distance disappears because the great state universities in both places hold jointly the highest claim upon my allegiance. Both, now, are "home" to me. Both institutions share in a significant historical heritage. Ohio was the first state carved from the Northwest Territory, Minnesota the last—both fruitfully faithful to the mandate that "schools and the means of education shall forever be encouraged."

This is the campus of my remembrance. Like Antaeus of old, what grateful son of this University will not gain strength by touching the ground upon which it stands! I have seen again today the buildings in which as a rather frightened Freshman I studied thirty-eight years ago this fall—incredibly, more than half the whole period this anniversary celebrates! How fully established and imposing the University seemed to me then; how dignified and deeply respected its leaders and teachers of that time! The urge to name some of them and to pay affectionate tribute to their inspiration is almost irresistible. But how vastly greater today, the achievements and the influence of this great institution which has become in truth "the developmental arm of the state."

Here it was my cherished privilege to share for a good many happy years in the service rendered by this institution under leaders whose vision and devotion have set the example of eminence that this occasion celebrates. "Prexy" Thompson, Dean George F. Arps, President George W. Rightmire, Dean William McPherson, President Bevis—

with these I was most closely and responsibly associated, and to them my debt is beyond payment. Each of their names evokes for me the warm remembrance of others who marched (and still march, many of them) in the vanguard, sharing the burden of the day. We worked together in what we believed were great enterprises. Their encouragement and generous assistance I shall not ever forget. How much all who love this University owe to them!

It was not, however, as an alumnus nor as a former staff member that I was asked to bring you official, though none the less sincere, greetings. I am commissioned to convey to The Ohio State University the cordial congratulations and profound respect of the Association of Land-Grant Colleges and Universities.

This Association salutes Ohio State, with full recognition of the fact that no institution in our whole great chain of the states and territories has made, historically, a richer contribution or has given greater strength through distinguished service to the "land-grant tradition." The importance of this encomium will be best understood by those sufficiently familiar with the history of higher education to understand that this land-grant tradition, more than any other single influence, has shaped the present pattern of higher education in America.

SINGLE events arise, of course, from the influence of a larger environment. The early 1870's, during which this University began its life, were epochal for education in this country and abroad.

The new Ohio School Code of 1873 marked an important stage in the strengthening of public education in this state. Seventy-five years ago exactly, the Ohio General Assembly provided for the establishment and maintenance of city public libraries.

In England the Education Act of 1870, amended by the Elementary Education Act of 1873, laid the basis of all subsequent school legislation for that nation. Under the French Third Republic, established in 1870, foundations were laid for national education which endured until World War II. Establishment of the German Empire in 1871, under Prussian influence, expanded the nationalistic character of education in that country unhappily, but it also broadened the base of the remarkable state-supported universities which introduced the

idea of research into American universities. The intellectual world was in ferment from the discoveries and the ideas of Darwin, Huxley, Kelvin, Helmholtz, Pasteur, Koch, and others, as historians of the time have pointed out.

Institutions take their character from the social need which brings them into being, and from the character and capacity of their response. In the United States, the land-grant colleges arose from a national need. They were products of a democratic demand which the higher education of their day neither recognized nor would have been disposed to meet if it had. In the climate of then contemporary academic attitudes, they were unwelcome and their purposes poorly regarded. If they were to succeed, they must not only prove their place by service in each state, but must also gain strength as progressive partners in service to the nation.

It was a hard assignment, requiring leaders of social insight, leaders with an indomitable faith in a destiny still to be determined. A little cluster of great men gave meaning to the movement, established with the signing by Abraham Lincoln of the Land Grant Act of 1862. Important among those who helped in this emancipation of the entire concept of higher education are several Ohio State pioneers. In fact, the first Morrill Bill, vetoed by President Buchanan, might never have been reintroduced and passed as the Land Grant Act except for the determined leadership of an Ohioan, Senator Ben Wade of Ashtabula. Another powerful figure in the nation-wide movement which brought the land-grant colleges into being was Norton S. Townshend, early trustee and first professor of agriculture at this University, whose efforts have been ranked with those of Jonathan Turner of Illinois.

A distinguished Ohio State pioneer, Albert B. Graham, my long-time friend, helped conspicuously to give form and future to the most extensive system of adult education in the world today: the agricultural extension service conducted jointly by the federal government and the states through their land-grant institutions.

I met Mr. Graham first when I was a student; he had come to the basement of Brown Hall to have lantern slides made in the photographic laboratory of Professor Frank H. Haskett. I can remember my first sight of "A. B.'s" tall, gaunt frame, his rugged countenance,

the twinkle in his eye. I remember the rumble of his deep voice and the contagion of his chuckle.

He was Ohio State's first superintendent of Agricultural Extension—nearly ten years before Congress, in 1914, authorized organization and support of federal-state extension under the Smith-Lever Act. At the time I first knew him, Mr. Graham was traveling over this state—ten thousand miles a year—by horse and buggy, by slow train or afoot, in winter and summer, in snow or hot sun or rain, lecturing and organizing. He was an agricultural evangel, striving to elevate the standards of rural life, preaching the doctrine of hard work and sound character among rural youth, trying to improve farm practices and agricultural productivity through science.

The American farmer today is the most efficient agricultural producer in the world. Last year, the American agricultural extension service reached into the lives and work of nearly five million farm families. Ohio can claim far more than its statistical share in that achievement, and no small portion of the credit is due to the pioneer labors of Albert B. Graham.

Since the passage of the Land Grant Act, countless speakers have traced its origins and have sought to interpret its purposes and prospects. No one of these has ever equalled the prophetic vision of The Ohio State University's William Oxley Thompson. Very soon after coming here, he became a commanding figure in the land-grant organization. He was for many years a member of its executive committee, and its president in due course.

His interpretation of "The Mission of the Land-Grant Colleges," in his first major address to the Association in 1903, was a ringing challenge to conceive of higher education in new terms. He spoke with the zeal of a reformer. He urged a broadened curriculum adequate to an expanding economy, dependent for its development upon science and industry. He reminded the struggling little land-grant colleges of that day that they were really national universities and must meet the measure of national greatness.

Nine years later, addressing the Association at Atlanta, Georgia, on "The Influence of the Morrill Act upon American Higher Education," he spoke with the greater confidence that his work here at this

University had clearly justified. He stressed the spreading service of the land-grant institutions to the children of the common people, their strength at the grass roots. Reasoning from the land-grant precedent of federal support in co-operation with the states, he spelled out thirty-six years ago the completely convincing argument for federal aid to the public schools which Congress still, incomprehensibly, lacks the courage or conviction to concede but which is inevitable.

Practical utility, not snobbish academic respectability nor any notion of intellectual aristocracy, must be the test of institutional integrity, he declared. "An institution," he said, "is to be operated for the good it can do; for the people it can serve; for the science it can promote; and for the civilization it can advance."¹ That summons needs no revision today.

There are land-grant state universities today larger than our own. Some may claim greater eminence in this or that area of scholarship and science, conceding superior prestige in other areas to us. None can claim a richer contribution to the development of the philosophy of the land-grant idea and to its realization. In William Oxley Thompson, The Ohio State University furnished the foremost spokesman of democracy in higher education in his generation—and that was the generation which set the bench marks upon which future advance must be based.

The great modern state university has outgrown, of course, the early and limited land-grant college assignment of "agriculture and the mechanic arts." It takes all knowledge for its province and has enlarged incalculably the modest beginnings of research which the federal government made possible for the land-grant institutions under the Hatch Act of 1887. But let no professor on its staff ever forget the land-grant origin which gave vitality and impetus to the whole state-university development in this country.

PAST glories are the proper subject of any anniversary, but only when they provide an occasion for the appraisal of past achievement as the basis of future upgrading and ongoing. The difficulty of organized education is now just what it has always been: the difficulty of perspec-

¹ *Proceedings of the Twenty-Sixth Annual Convention of the Association of American Agricultural Colleges and Experiment Stations*, p. 92.

tive, of thinking outside the system in which we find ourselves. "The chief danger inhering in university circles," my distinguished Minnesota predecessor, the late President Lotus D. Coffman, once warned "is that they will become intellectualized and standardized and that in consequence their pliability and usefulness . . . will be diminished, if not destroyed. . . . It is certain that any university which loses step with current movements, which fails to give consideration to the sweeping changes that are occurring in every part of the world, will soon become archaic and incompetent to educate youth for the exercise of leadership."²

New occasions must teach new duties. New challenges confront American higher education today from a dozen directions. The Ohio State University is well aware of them, we know; and we sense a vibrant urge and energy in this University today to meet them, if the means can be provided. Important among those challenges is the present-day demand for a better job of "general education."

The "sweeping changes . . . in every part of the world," of which President Coffman spoke, have occurred—and in a time much shorter than the seventy-five years which this anniversary marks. Two world wars and a paralyzing depression have been accompanied by the staggering sweep of proletarian socialism over the minds of men, with its constriction of individual freedom. Is this the hopeful picture of "humanity on the march"? Or is it the disappointing "revolt of the masses," pictured by Ortega y Gasset as plunging all civilization toward a totalitarian statism in which humanity will have developed "all the talents except the talent to make use of them" as he says?

Youth needs to know. Plainly, the traditional academic approach to liberal education has not kept step with world crisis. There must be likewise among us an uneasy awareness that the success of our highly specialized land-grant college training is not sufficient unto the day, or the evil thereof.

The danger in higher education today is not that it is over-professionalized. The increasing complexity of modern life will require more specialization than ever. The danger is that our teaching and

² "The Obligation of the State University to the Social Order." *The State University: Its Work and Problems*. Minneapolis, Minnesota: University of Minnesota Press, 1934. pp 206-207.

learning are under-liberalized. It is from the liberal and social studies that our value-judgments come, and the ethical conclusions to guide action. But action is the test, and the job of general education is to make the humanities more functional, more relevant to life.

There is likewise the challenge of larger numbers who must learn. Some people seem staggered by the recent recommendations of the President's Commission on Higher Education, which urges by 1960 a doubling of present bulging college enrollments, to be made possible largely by increased federal support. Perhaps the estimates are extravagant, but those steeped in the land-grant tradition will recognize merely an extension of both the principles and policies which enabled them to accomplish the democratization of higher education. Surely they will not shrink from that assignment, the burden of which they must bear.

The challenge of a greatly expanded need for adult education, also made clear by the President's Commission, must be faced. It is grown men and women who must make the hard decisions of the day. Who among us knows enough?

Agricultural extension, inspired and invented by the land-grant colleges, has developed the "know-how" to tackle the job. We are already hard at work helping farm families to understand not merely the techniques of scientific farm practices and production but also the social significance and possibilities of rural life—its meaning and values, its dignity and democracy. I am convinced that the "ag-extension" way can be one tested approach to the now larger challenge in adult education.

THE land-grant colleges were a changing society's response to unmet needs. Their vigor sprang from the faith that they were tackling a job that was new and necessary. One of their present tasks is both old and new but still necessary: the never-ending defense of freedom, hard-pressed in the world today by foes within as well as without. That is the lesson of the "cold war" with its Trojan-horse tactics in this country. Universities, above all institutions in society, must serve the cause of freedom because only in that climate can they survive to serve at all.

It is the imperative business of government to hunt down and prosecute—but always under “due process of law”—the collaborators with hostile foreign governments. Facing these dangers, universities must not suppose themselves “above the battle.” They, too, have the inescapable obligation of patriotic loyalty.

But the roles of government and education are different. It is the conflict of ideas, not of espionage or armies, with which universities are best equipped to deal—and their long-range reliability in this regard has been proved through centuries. Let them stand firmly and uncoerced for the principle of freedom—freedom to think and speak and teach, subject always to openly assumed responsibility and the restraints of law.

Let us remember, too, that the ideas which have saved civilizations from stagnation and decay have always been upsetting, some might say subversive, in the sense that they overturn our prejudices and preconceptions. In science, in economics, and in politics this has been so.

“A clash of doctrines is not a disaster—it is an opportunity,” the philosopher Whitehead has said. There is no safer place for the clash of ideas than in universities where the instinct of disinterested analysis and of relentless criticism is deeply ingrained. Despite occasional loose comment to the contrary by those who do regard as a disaster the clash with doctrines contrary to their own, universities above all places will resist the erosion of freedom and the regimentation that totalitarianism, of either the left or right, requires.

Surely, in the tensions of this or any other time, universities must stand as islands of intelligence and reason in the swirling main stream of excited propaganda. They must resist the understandably frightened but indefensible surrender of freedom. Surely, two and a half million picked American youth at work in the calmer climate of learning and scholarship are a hopeful hostage to the long-range security of the nation. How reassuring, in our concern for the future of freedom, to think of our whole land, as former President Lowell of Harvard once phrased it, “aglow with universities and colleges like a field with campfires of an army on the march.”

We have only attempted to appraise the impact of world war and world change upon education in this current mid-century, and to pre-

dict the problems which colleges and universities must newly meet and somehow help to solve. Yet, who will lack faith that this University, which has so nobly justified the generation which conceived it, will fill its even larger place in the future? Ours will be still the historic American faith of Horace Mann, "father of the common schools," faith in the improbability of mankind through education—the faith, as William James declared, that "the world stands really malleable, waiting to receive its final touches at our hands."

OUR DIAMOND JUBILEE

By HOWARD L. BEVIS

STUDENTS of the Scriptures, now unfortunately fewer than in former times, will be familiar with the ancient Hebrew institutional celebration, the Year of Jubilee. Students of contemporary history (and those of us who seem old to students now in college) will remember the Diamond Jubilee in Queen Victoria's time, celebrated throughout the Empire upon which it then was confidently believed the sun would never set. In planning for this celebration of Ohio State's seventy-fifth anniversary, we fell almost unconsciously into the habit of calling it the Diamond Jubilee; and in spite of some conscious effort to cast the name off, it has stuck. Perhaps it is just as well, for there is, I believe, an underlying significance of some moment in the comparison of Queen Victoria's Jubilee with ours.

Queen Victoria's statesmen and her guests from every land celebrated British pre-eminence in a completed world; a world to which, to be sure, a few finishing touches remained to be added, but one, nevertheless, already the best of all possible worlds, one in which mankind under the benevolent tutelage of the "enlightened countries" would continue to live and grow in never-ending progress toward the condition of those countries themselves. The physical abundance produced by the Industrial Revolution and the exploitation of the "new" continents had minimized at least one of the major causes of war; and from St. Helena onward, the world at large had prospered in comparative peace. It was reasonably believed by most responsible publicists that there could never be another great war. Indeed, why should there be? Peace paid so much better. Democracy was patently the predestined path of political development. Education was spreading its disposition toward reason and harmony further and further among the masses of the people. If in one or two great countries the anachronism of absolute monarchy still prevailed, it was assuredly an historical holdover which would gradually disappear as conditions produced the occasion for its departure.

For almost a century, this nearly completed world had been building. Young people knew no other. Grandparents who recalled more

troublesome times were dying off. The paths were straight. The rules of success were known. And any one of good will, character, energy, and the proper moral orientation could attain success if he followed the rules. The Year of Jubilee had come indeed, and for almost another generation the western world lived in the glow of its effulgence.

Tacitly accepting Britain's globe-circling omnipotence as a permanent fact, Americans, nevertheless, felt an insular superiority in the continental homeland they had established between two oceans. What if they still lacked certain of the refinements of an older civilization? Some thought such refinements effete. Others were sure we could have them when we wanted them, for we were growing rich. An unexploited continent dowered with every natural good, together with cheap money and cheap labor from the less fortunate Old World countries, was filling our barns and lading our tables. When or where had so many eaten so well, lived so independently, looked forward with such confidence to a satisfying and expanding future? In this period The Ohio State University came of age, emerged from adolescence into mature life with all the expectations and most of the inexperience common to the adolescents of its time. Only those who are students of contemporary history (or those of us who seem old to those in college now) can appreciate how shaky were those foundations, how different the future for which Ohio State must now prepare its students.

Whether one accepts or disagrees with Mr. Toynbee's thesis that Western civilization is centered in and based on Europe, he is bound to observe that the settled fixity of Victoria's closing days is shattered beyond repair. Wars have become almost the norm of modern life, certainly not the impossibility. Blue water, upon which Britain's argosies sailed to the littoral reaches of every land, has now been largely replaced by the trackless air as a medium of communication. Britain herself, paramount because she was Mistress of the Seas, together with most of the contemporary great powers of Victoria's day, has shrunk to secondary significance, leaving the world either to be exploited or developed as may please the two remaining colossi, the United States and Russia.

With only passing reference to the volumes which have been written to account for the state of the world in Victoria's day, we may hazard the assertion that there were two major forces which, after

operating to create the world hegemony of western Europe, have latterly with equal efficacy co-operated to bring about its decline. Those two forces were industrialism, with its handmaiden, technical and scientific research, and democracy, generally concomitant with industrialism, though an uneasy bedfellow a good deal of the time. As from a stone cast into the water, the impact of these forces has spread out in wider and wider circles, while the center itself has flattened to a faintly undulant calm. Countries once peripheral have now become the loci of power and productivity. Europe now subsists by their aid. This observation is of the greatest importance to us, for in the United States this shift of kinetic energy is most strikingly manifest. More especially is it of importance to our American universities, for without them the United States could not have attained its present commanding position and, with the partial eclipse of the Old World centers of learning, upon them rests in awesome measure the responsibility for the immediate future of mankind. Seldom in history have issues of such world-wide significance been so sharply and so completely drawn. Two ways of life, one authoritarian and the other democratic, each zealously championed by one of the great powers, contend for the hearts and minds of men. Each champion seems willing to fight to the death, if that be necessary.

WITH a dim but growing sense of higher education's position at this juncture of world history, The Ohio State University celebrates this year its Diamond Jubilee. But in what a different atmosphere from that which characterized Victoria's Jubilee, in what a different spirit! Who, now, has a sense of completeness, of established and predictable order, of having arrived at a permanent plateau of continuing success? Who, now, can descry a future that holds the assurance of continuity of Western hegemony over the other peoples of the world? Of this only can we be reasonably sure: Without the universities, America would not now be one of the two remaining great powers; and upon the universities will largely depend the direction which America can give to events that are to come.

It is not in the spirit of this occasion to exult in our progress from humble beginnings nor to take to ourselves glory because we have grown large. The students to whom the Ohio Agricultural and

Mechanical College opened its classes seventy-five years ago were few, but even fewer were they at Harvard of whom the elder Holmes sang:

And who was on the Catalogue
When college was begun?
Two nephews of the President
And *the* Professor's son.

Our 25,456 registrants of a year ago were, of course, a goodly company, but equal and greater numbers thronged other American campuses; and we should have been derelict, indeed, had we taken fewer than offered to come from the confines of our state. We are gratified, of course, to have grown steadily in the esteem of our General Assembly from the time when it hesitantly gave us the sum of twenty-five thousand dollars with the stern admonition that never, never must so extravagant a request be repeated, to the time when, for operating expense and capital improvements combined, it appropriated to us in one biennium more than forty-two million dollars. We are happy, of course, to be able to offer one of the most comprehensive programs to be found in any university catalogue; to have, at our peak of enrollment, a ratio of more than one instructor to ten students. We rejoice, even, in the inconvenience you are having today in picking your way about our campus through the excavations and piles of building material which promise facilities more nearly adequate to the tasks which our constituents have laid upon us. We take, of course, a proper satisfaction in all of these things and many more with which I shall not weary you; but we have not asked you here to help us celebrate the fact that Ohio State is big. That fact is no longer news, nor is it unique to this institution. Our concern is with the quality of what we are endeavoring to accomplish, the goals to which we bend our energies, the capacity we can achieve to bear our part in the critical days ahead for America and for mankind.

We can smile now with complacent hindsight at the forecast made of this University in 1870 by the *Cleveland Herald*: "We make the prophecy that the time will prove the College [now Ohio State] to be a failure and the fund [for its establishment] to have been wasted." The *Cleveland Herald* is now defunct.

We are reasonably sure now that the enterprise has not failed and

that the money has not been wasted. But questions open up before us as we today peer into the future, as doubtful of definite answers as was President Orton when the very continuance of the University was at stake. When we review the early decisions our administrative predecessors had to make, it becomes apparent, in retrospect, that those of greatest long-range importance were not basically dissimilar to those we face. They, too, concerned the character of the institution.

SINCE this was a "Land-Grant College" established with funds provided by the federal government (supplemented somewhat by a grant from Franklin County), that character was determined by the purposes of the Morrill Act and the presumptive intent of Congress. Without question, the act contemplated a new departure in advanced education. It spoke specifically of "agriculture and the mechanic arts." It was intended to benefit the many instead of the selected few. It pointed toward technologies and the sciences which should support them. It aimed at occupational proficiency and the personal advantages its attainment would bring. It looked toward material prosperity based upon the exploitation and development of our nation's resources, then largely latent because our people did not know how to use them. All this was clear, and because of this specific clarity many argued that the entire range of the new school's functions was subsumed under the heading of "material benefit."

A fairly cogent case, indeed, could be made for this view of our chartered functions. Were there not already throughout the land colleges dedicated to, and experienced in, the training for culture and spiritual advancement? Was it to be supposed that these new "material" institutions could perform that task as well or, even if they could, that the great paternal government intended to support competitors in an enterprise already fraught with financial hazard and dependent on professorial devotion? In any event, would it profit students who came to learn about better cattle, more productive soil, or the way to lay out the roadbed of a railway to spend time on literature, languages, philosophy, or the theories of political economy?

Nothing, it seems to me, more clearly attests the statesmanship of the University's earliest officers than the decision of the Trustees, announced in 1874—one year after classes were opened—to provide

"a broad and liberal curriculum . . . for trained and educated minds ever have, and ever will take precedence, over ignorance and limited knowledge, in all the affairs of life, and it is a mistaken notion that a narrow and technical education is all that is required in the industrial pursuits of men."¹ Long discussion had preceded this pronouncement. For example, Governor Brough, in his message of 1865, had said: "It is evident that the intention of the enactment is to institute a new and distinct species of education. . . . the instruction of the industrial classes . . . incidentally for their own benefit, but actually for the increase of national production of wealth."

The Trustees refused to accept such a narrow interpretation. They would "as in duty bound by act of Congress, make the principles of Agriculture and the Mechanic Arts 'leading objects' in their institution," but they did not "desire to educate those confided to them simply as Farmers or Mechanics, but as men, fitted by education and attainments for the greatest usefulness and the highest duties of citizenship."² Nor did the Board forget women. At the very outset, it decided to accept "all persons," thereby including women who met the qualifications for enrollment.

The Board's statesmanship in holding to the broader pattern is accentuated by the fact that this generated greater opposition in the General Assembly and made it harder to obtain funds for what was sometimes called a "godless institution, where the faith of earlier years would be eaten away."

IN TRACING our development from that day to this, all friends of educational progress in America can find enduring satisfaction in the knowledge that the faith of our institutional fathers has, in the main, been kept. In keeping that faith, we have held fellowship with the faithful in other states where similar patterns have developed and comparable outcomes have been experienced. Our colleges of agriculture and the mechanic arts, together with those preparing for other professional and occupational pursuits, have grown up about core colleges

¹ *Third Annual Report of the Trustees of the Ohio Agricultural and Mechanical College to the Governor of the State*. Columbus: Nevins and Myers, 1874. p. 9.

² *Second Annual Report of the Secretary of the Board of Trustees of the Ohio Agricultural and Mechanical College, for the Year Ending January 4, 1873*. Columbus: Nevins and Myers, State Printers, 1873. p. 7.

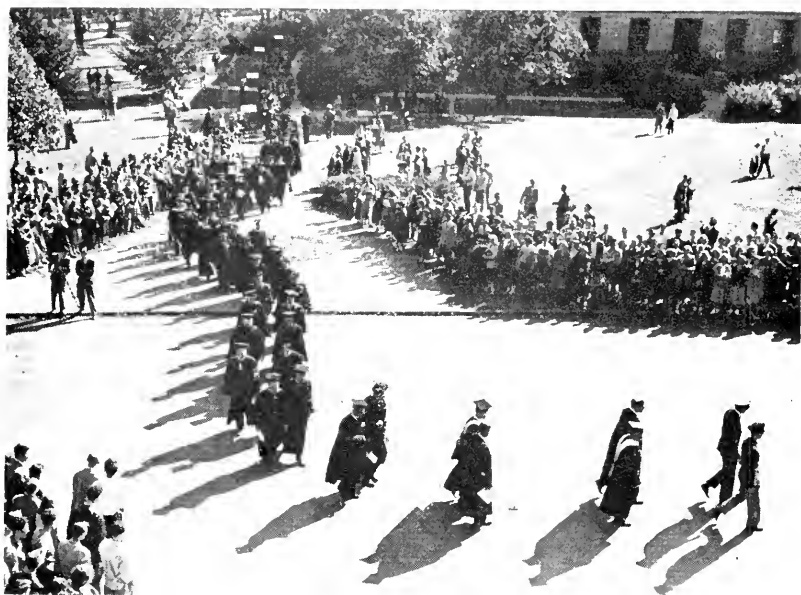
of liberal arts and sciences, which are the centers of institutional life. These core colleges are taking their place with the best. In pressing the advancement of our several units, it is, in my judgment, on these central and vital areas that emphasis should be placed. Although we at Ohio State know that changes cannot be made quickly nor by fiat, we are constantly endeavoring to implement our faith in the importance of these core colleges. We do not lightly promise the attainment of our goals, but we do promise ceaseless dissatisfaction with mediocrity.

Whatever comfort we may take in the limited fulfillment of our founding fathers' vision, we know full well that this is no day for complacent satisfaction. Were their objectives *in specie* still our objectives, we should yet have far to go. But their world is not our world. Their preoccupation with the character of the institution is our preoccupation; but that character, that specific character, must change with the changing times.

The future is so clouded that we can only grope for direction. Yet we must plan, if only to have plans to depart from. In planning for the future of Ohio State, this question of major importance immediately presents itself: Shall we seek to expand our undergraduate numbers to the limit of our competitive ability or shall we place our emphasis increasingly on graduate and professional work in which research and service shall stand upon their own feet, financially and otherwise?

We may assume, I think, at this stage that research is essential to greatness or even respectability in any university. We may assume, too, that an undergraduate base is desirable in a complete university structure. The question is one of emphasis.

In the growing competition which higher education must face for its share of the tax dollar—competition with welfare, highways, health, and so on—increasing attention must be given to the economy and efficiency of the state's entire educational plant, publicly and privately administered. This consideration clearly indicates the decentralized utilization of all existing college facilities adequate for the purpose. The same consideration, however, as clearly indicates that the "expensive" work—for example, that in engineering and medicine, requiring much costly equipment; that in the graduate and professional categories, requiring highly paid instructors for relatively small classes; that



THE ACADEMIC PROCESSION



PRESIDENT BEVIS SPEAKING AT THE CONVOCATION

in research, requiring both costly equipment and costly faculty—be considerably centralized to avoid duplication and to obtain maximum results from the expenditures of funds and effort.

It would seem the part of wisdom, therefore, to re-emphasize the policy established by the state legislature in 1904 and confirmed by the Inter-University Council in 1941, namely, to make The Ohio State University increasingly a center of research, of graduate and professional work, and to share gladly with our sister institutions the giving of undergraduate instruction.

OUR attempt to plan for the next steps is rooted in our belief that satisfactory life in America is vitally and increasingly dependent upon the continual development of American higher education. Satisfactory life in the American sense implies production adequate to the people's wants, economic and political organization adequate to the maintenance of complex modern life, and cultural ideals infused by spiritual aspirations within the reach of more and more of the people. This burden rests peculiarly upon American higher education, for war and totalitarian philosophy have gravely impaired the capacities of Old World schools.

The pressure of population upon subsistence, foreseen by Malthus, has been averted since his day largely by the discovery and occupation of new lands and the utilization of unappropriated resources to be had for the taking. This period of living on Nature's bounty is visibly approaching the end. Life can continue to multiply and proceed at accelerating tempo only if human science and human industry can transmute the resources of the soil we now possess into more and more and newer and newer things. The ingenious manipulation of what is already known is no longer sufficient. Basic research for useful knowledge and the dissemination of that knowledge among those who can apply it are indispensable to the continued civilization of the world. Basic research and the wide dissemination of knowledge are peculiarly the functions of modern higher education. Without its services we should have lost the war. Without them, life in peace, if such peace be possible, must degenerate into a straitened regime of gradually diminished standards until the grim law of biologic balance has its way.

In science and the dissemination of knowledge lies the only hope

of adequate sustenance and supply. But it is a hope of unexampled brilliance. Standards of physical living never before glimpsed in human history lie within our reach. Higher education is essential to their realization.

But the mastery of Nature and her physical laws, although indispensable to widespread human happiness, of itself can avail nothing without the development of political and economic systems which will facilitate the distribution of the products of our industry and safeguard ethical and enlightened human conduct. How to stimulate initiative without encouraging oppression, how to relieve misfortune without fostering dependence, how to preserve peace and order without yielding to despotism, how to maintain democracy without confusion and impotence—these are but some of the problems to which we need better answers. Higher education must seek and find them.

How to fashion a state to serve individual men is but one-half the task. How to build and develop the men is the other. More than physical plenty is required—much more. For thousands of years, the human race has been recording its efforts to cultivate and develop its mental and emotional capacities. In our new-found zeal for science and material betterment we are in danger of neglecting this infinite store of human experience. Not that the record is a closed book; higher education has its continuing contribution to make here also. It is a vastly profitable book in which the greatest of all time have written; and higher education is its best interpreter.

Beyond knowledge and reason, beyond the thrills and transports of emotion, there is faith, that indefinable faculty which fastens upon objectives dimly sensed and unlocks capacities otherwise unrealized. Education which ignores faith must, in my opinion, retrograde to ultimate sterility.

If in some respects we know more than we did in 1873, the demands upon our knowledge and wisdom have made our relative progress small. If there is any relative gain, it is, I believe, in the increased sense of our own finite capacity in the presence of infinite need. I believe, too, that we are less assured in the mastery of material things, more humbly ready for the guidance of Infinite Good. In a world adrift from moral anchorage, as much of it seems to be, this belief may seem precarious. I still hold it. Its validity is the hope of the world.

THE FIRST CONFERENCE

Chairman:

CHARLES E. MACQUIGG, Dean, College of Engineering, The Ohio
State University

Speakers:

CHARLES F. KETTERING, Board of Trustees, The Ohio State University
CORNELIUS KRUSÉ, Chairman of the Department of Philosophy,
Wesleyan University

OPENING REMARKS

By CHARLES E. MACQUIGG

BIRTHDAY parties traditionally are happy occasions. In childhood, they are gleefully awaited for the generous rations of ice cream and cake that they provide. In youth, they mark the coming of the day of emancipation from necessary repressions. In old age, they are endured, if we can believe with Harriet Beecher Stowe that the sugar is at the bottom of the cup.

Since we are this evening attending a part of the birthday celebration of a seventy-five-year-old, it may not be inappropriate to observe that educational institutions are unique in that they are a species of organism that does not grow old with the passing of the years. True, their buildings may deteriorate and must be replaced occasionally. But even the floors, worn by generations of seekers after knowledge, take on a hallowed atmosphere. With the years an institution acquires a ripper experience which inspires veneration. That this is true, we gather from one authority, Harriet M. Townshend, a surviving member of the class of less than a score which entered this University for the first time on September 17, 1873. This lady, whose life has been lived in the shadow of her alma mater, expressed the opinion just the other day that the University has become better in proportion to its growth. Hence, we are meeting this year in a spirit of rejoicing for the good accomplished in past decades but more especially to receive counsel from distinguished men and women to help us chart our future course. Tonight we are having the benefit of such counsel.

The first speaker, Charles F. Kettering, one of the leading inventors and research engineers in the history of this nation, is an Ohio man. Born and reared near Loudonville, he is a graduate of this University in the class of 1904. To repeat the catalogue of his accomplishments and of the honors bestowed upon him would take more than the time allotted for the program and because of his renown would be superfluous. He has been honored with the doctoral degree by several leading colleges and universities, and awarded nine medals, including the Washington Award by The Four Founder Engineering Societies

(the highest award in the profession of engineering), not to mention decorations bestowed by foreign governments. He is a trustee of this University and of Antioch College. His technical work has been devoted to the development of transportation through the automobile and the diesel-electric locomotive. Notwithstanding a phenomenal record of inventions and practical developments, he has found time for effective effort in fields related to the national defense, in researches on the nature of chlorophyll, and on other equally diverse subjects.

In scanning the account of the speaker in *Who's Who*, I detected an apparent error in the statement that he had "retired" in 1947. As a statement of fact, that does not comport with his present activities. Finally, and this is the kind of testimony that must come from personal acquaintance, he is unfailingly gracious and has an especial interest in young people. Charles F. Kettering will address us on the subject, "Science and Technology—Servants of Man."

Our second speaker has devoted his time to a different but no less important sphere of effort. Cornelius Krusé has served as professor of philosophy at Wesleyan University in the state of Connecticut, and as chairman of that department since 1923. He holds degrees from Eden Theological Seminary, Yale, and Wesleyan. His services to the whole world have been distinguished. A member of the American Philosophical Association, he acted as secretary-general of that Association for a number of years and also as vice-president. He has acted as president and officer of various national and international congresses having to do with socio-political questions and until recently was director of the American Council of Learned Societies. He has been called upon by the State Department and by foreign governments to undertake numerous cultural missions to South American nations. He served as secretary of the Foreign Service of the American Friends Service Committee during the period of its relief work. In view of the title of his subject, he may be interested to know that this University was one of the first to increase the engineering curriculums from four to five years in order to introduce certain non-vocational subjects. Cornelius Krusé will address us on "Humanity's Need for the Humanities."

SCIENCE AND TECHNOLOGY—SERVANTS OF MAN

By CHARLES F. KETTERING

ALMOST all the important technological developments, with the exception of the railroad and the telegraph, with which we are surrounded as we celebrate this seventy-fifth anniversary of The Ohio State University have been made since this University was started. In terms of geologic time, three-quarters of a century does not seem long, but in terms of the increased ability to make things, the period has been epochal. As a representative of technology, I believe that such progress has been made in science and its application to materials that we have every right to say to you that you can ask us—the inventors, engineers, and so on—for almost anything you want. If you do not set the day you want it, we can make it for you. Never before has man had such facilities for making things as he has today.

Technology is concerned with making what you ask for, in producing a product which can be sold across the counter to a customer for two kinds of profit. If I don't sell an article for more than it costs me to make, the sheriff comes to see me. And if the article isn't worth more to the customer than he pays for it, he will not buy any more. The amount by which the sale price exceeds the cost is called profit and is published in the financial statements. But the most important profit in the world is one we never mention, one that is not included in a financial statement as return on capital. It is the customer's profit, the amount by which the article's value to the customer exceeds the price he pays.

To find out the amount of a customer's profit, let us look at an example or two. Maybe you have a radio in your home. If you were not able to obtain another, how much more would you pay for the one you have than you did pay? The increased amount is what you think the radio is worth. The difference between the amount of its worth to you and the price you actually paid is profit. How much more would you pay for a telephone? Because you would be willing to pay more for your telephone rather than to lose it, you make a profit on it. This customer's profit is the motive power of technology. In the same sense,

the power that makes the world move is only 5 per cent "high" motives and the remainder utility and return on investment.

Such a judgment may not seem sufficiently idealistic, but we inventors naturally look at life in a somewhat different way from academic persons because we have to *look at things*. If we can learn to understand a thing better by drawing diagrams on the blackboard, we do that. But ultimately, the only way we can transmit whatever we do to you is through some thing. That is rather like publication. If you have an idea or philosophy, you can write a book which is then made into a product and distributed. In other words, you publish your ideas in books. Inventors publish their ideas in things. We might say that we don't manufacture automobiles, we just publish ideas in metal. And people ride around in our ideas.

WE IN America excel in this process of duplication which was started by the printers. We call it mass production, which is really nothing but the ability to make pieces alike. The art of printing is the ability to put paper in a machine so that all the pieces of paper which come off the press read exactly alike. Later, other industries began to duplicate parts. If you tear down a piece of apparatus into its parts and make more parts like them, you can put the parts together again and have more of the apparatus. The parts cannot be put together to make anything else. Over in Germany before the last war, a man stole parts from the factory where he worked which he supposed made baby carriages. When he assembled the stolen parts, they made a machine gun. He said that he couldn't put the thing together in any way so that it would come out a baby carriage. Mass production is just that simple—the duplication of parts.

It is not necessary to know anything to reproduce an article, once you have the sample. During the war, for instance, we took a contract to make machine guns. I happened to be in one of our plants when the proposed gun was being discussed. Our men objected that they didn't know anything about guns. I asked the colonel present if he had shot the gun, if it was all right. He assured us that he had and that if we could make more guns like the one in front of us they would be fine. He insisted that it wasn't necessary to know anything else:

"All you do is take this gun apart, make more pieces like the ones it contains, put them back together, and you'll have more machine guns that will shoot just exactly as this one does."

The art of making two pieces alike or a billion pieces alike has been perfected in the United States to a degree reached by no other country. The tooling necessary to make pieces alike has reached an amazing degree of accuracy. Take a simple item called a piston pin. We used to think that if we made our piston pins the same diameter to within a half-thousandth of an inch we were doing all right. Today they have to be within a tenth of a thousandth. And we are making our diesel injectors to within ten- or fifteen-millionths of an inch of the same dimension. People say it isn't practical to do that. I do not know whether it is practical or not, but we made eighty-five thousand diesel injectors a month all of which were within those limits. Of course that job was done by machine tools; nobody can make one of those parts by hand to those limits except by very tedious work.

Such accuracy is made possible and practical by the improvement in machine tools. We used to think that if the tools for an automobile cost several million dollars, the figure was high. Today no manufacturer would use a set of tools at that cost (taking the inflationary factor into account) because the engine would not be as good as if he spent six or seven times as much for the better set of tools now available.

In spite of our apparently amazing progress compared with what remains to be done, nothing has been done yet—nothing at all. We have only touched the surface of what is to be known. We have a few gadgets, but we know nothing about metallurgy, nothing about plants, nothing about biology; we know very little about electricity.

The great chemical industry is just opening up entirely new fields. The production of synthetic rubber during the war, for example, was one of the greatest new developments in our war economy. The Japanese knew that we would be no good unless we had rubber tires, but they were perfectly sure we did not know enough about synthetic rubber to make tires out of it. But we did. The tires were not as good as they should have been to start with, but neither is your golf score as good when you start as it is after you practice. As we made tires,

we improved them. Now that we can get natural rubber, the tire makers prefer natural rubber modified by the synthetic techniques they have learned.

WITHOUT question, on its seventy-fifth anniversary this university is entering into a new era in which technology is one of the important factors. We as technologists do not want to set our field apart; we want to be servants of humanity. We want to make it easier for you to do the things you want to do in the way you want to do them. If you want to listen to something over the radio, we want to make it easier for you to listen to it. If you want to see something over television, we want to make it easier for you to do so. If you want to go to see your aunt or uncle on Sunday in an automobile, we would like to make it easier for you to do that, too. Since technology is related cold-bloodedly to mechanical or materialistic things, it is often distinguished from cultural pursuits. We inventors and engineers do not think that there is any differentiation at all; we think that these technological and scientific advances are mediums for spreading culture. Because of the marvelous distribution system that we have through radio, people at the fishing camps today hear more music than you could hear in the greatest palace of music in the world a few years ago. In a short time, you will actually see events by means of radar and television. These are only mediums through which you are able to do the things that you would like to do, and do more of them in less time.

What you choose to do, however, is entirely your concern, not ours. The man who wrote the very clever poem about the people who drive from Jackson to Lansing and from Lansing to Jackson every Sunday wanted to know why, if they all stayed at home, there would not be just as many people in each place. There would, of course, but they would not have had the trip from Lansing to Jackson. I do not care why you drive from Lansing to Jackson and back; if you want to go that is your business. And if your cars do not break down on the road, we feel happy.

You can see that we have given you a facility; we have extended your physical entities through microscopes, through telescopes, through this, that, and the other thing so that you can better carry out the things

that you would like to do. Whether they amount to anything is not our responsibility at all. The public is under no compulsion to use any of the products which technology has supplied. The fear that technology is ruining the world is unfounded. If people did not buy what was made, the so-called "ruin" would cease. Industry is too far behind on orders to feel that the world is "ruined" enough.

FEARFUL people predict that we are going to run out of gasoline and oil, that we are going to starve to death. Maybe some of you heard the Town Meeting of the Air when the American Association for the Advancement of Science met in Washington and predicted that because of overpopulation we are going to starve to death. If we starve to death, it will be our own fault. Stupidity will starve us, nothing else. Those speakers did not tell you that 85 per cent of the population of the earth have never had enough to eat. Only 15 per cent have enough to eat, and you know where some of those are right now.

Our astronomers and geologists tell us that probably this earth was a chunk off the sun. As it cooled down and people, bugs, bees, butterflies, and so on came into existence, we had some nitrogen and some oxygen left over. There was a lot of oxygen left over in the oceans of the earth, which contain 320 million cubic miles of sea water. Eight-ninths of that is oxygen. If you really want to find out how much that is, figure out how long it would take you to dip the ocean empty with a gallon bucket. We had the carbonates and all the other things that oxygen went into, but we had the oxygen left over. Everything had been oxidized that could be. When the vapor cloud thinned out and the oceans began to fill up with water and the sun began to shine through, something in the energy of the sun became a deoxidizer. This made possible the life we call vegetation. We grow plants for food and then the oxidizers, which are animals, eat them. So we have two things. We have the deoxidizing sun raising the crops, and we have the people eating them. Now there is one thing of which you can be perfectly sure if you study the population distribution map: there are no people where there are no plants (outside of New York City).

So the factor that is going to limit population is the amount of

food you can grow. And the food that you grow depends on how much of the sun's energy you can put to work. We do not know anything about this problem yet, but it is one of the big problems that technology has to solve. How can you work the sun a little bit harder and get more work, more deoxidizing, done?

The only time when man should become frightened about starving is when the sun stops shining. We have a lot of needless worry in this country about food in spite of the fact that we are able to raise more than we need—so much more that we are shipping food abroad.

The fruit-fly experiment illustrates the fixed relation between food and population. Every high-school student should do the experiment. Put the fruit flies in a candy jar. Then measure out a fixed amount of banana for the fruit-fly colony. After a week, count the number of fruit flies. Then feed them another week and count them again. You will be amazed to find out how fixed that population stays. If you put in 10 per cent more banana, the count goes up 10 per cent; if you take out 10 per cent, it goes down 10 per cent. President Bevis said he hoped we would not run into that situation in the human family, but at least 85 per cent of mankind is on that margin now since the population is determined by food.

Closely tied to the fear of starvation is the fear of exhausting the land by erosion, by washing it into the ocean—a foolish fear! Since we know where the soil is, we can always go and bring it back.

Many who blame technology for all these potential evils overlook the fact that the tractor has made possible greatly increased production. Not only has it made plowing easier, but it has cut down the horse population by about eleven million. Since a horse uses four times as much food as a human being, the tractor has saved food for forty-four million more people, in addition to making it possible for the farmer to raise additional crops. The problem is just that simple to an engineer; to the biologist, the geologist, and the politician, it may be much more difficult.

DDT is another example of technology's contribution. With DDT you kill off a lot of bugs. Your crops are heavier. You can have more oxidizers. That is all we are, just oxidizers. So as long as there are food materials to be oxidized there will be organisms to do it.

We are entering this seventy-fifth anniversary of The Ohio State University with entirely new concepts of what our problems are. The student representative on this afternoon's program made me shiver because he believed that we are now in a dangerous situation. You are not in a dangerous situation today. Never before in the history of the world was there a time when you could not even fall down without falling into an opportunity of some kind. There never was a time when opportunities were scattered around in as great variety as they are now. The student representative had been listening to radio commentators and columnists who cannot hold their jobs unless they scare you. There is really nothing to be worried about.

Do not let anybody tell you, as they tried to tell Columbus, that we are headed for a place where we shall fall off. I saw a painting one time of Columbus trying to sell Queen Isabella on his idea—just like an inventor trying to sell a patent. The old fellows were all sitting back, listening but resenting, naturally. Now if Columbus had fallen off the edge and had never come back, that would have been according to theory. But he came back, and his return upset all the predictors and the theorists.

Fear of failure is as dangerous to achievement as the other fears we have discussed. The inventor cannot afford to be afraid. In invention a man may fail 999 times, but if he succeeds just once, he's in. Failures are not to be avoided. In fact it's the work of the day to fail because the more you fail, the more you know, if you have learned to fail intelligently. Failures are the stepping stones by which the inventor eventually enters the cathedral of success.

There is some question as to whether we can train inventors. I think it was the Brookings Institution that made a study which showed that the more education a man has, the less likely he is to be an inventor. I believe the reason is very simple. From the time a child starts kindergarten until he graduates from college, he has to take examinations about every two or three weeks or months. If he flunks, he is out—at least he used to be. The student becomes so afraid of failure that when he gets out of school he is fearful of tackling anything which entails even the possibility of failing.

Whatever our point of view toward inventors and technology, we

must realize that education, like applied science, is only emerging from its infancy. Let us look on this seventy-five-year-old institution as having just graduated from its pre-kindergarten concepts. In spite of its youth, however, it is a well-balanced university because no one thing is more important than any other. As I tell the people in medicine, the child who brings the flower to the sick patient is as important as anyone else in the organization. No one division is more important than another when all serve the common purpose.

I WANT to congratulate The Ohio State University upon its accomplishments of the past seventy-five years. The members of the Board of Trustees are making a long-range study of what this University is going to be like in twenty-five, thirty, forty, or fifty years. We do not think that it will be much different; the changes will depend upon the times. As our good friend Lew Morrill says, a good university is one that meets the requirements of the time and the community.

Never was there such opportunity for young people as there is now. If we will recognize that fact we shall get rid of our fear complex. Let us raise our eyes and take a look and see what we can do. Let us not say, "I could do that if. . . ." Let us drop the "if" because lots of times, if you don't look at the "if" too much, it automatically disappears.

You have heard the story about the man with delirium tremens who awoke in the morning to see a horrible creature sitting on his bed. It was a mixture of animal and bird and all that kind of thing. Finally he said to it, "Now look here, let's talk this thing over. If you get too rough on me, I'm going to take a couple of aspirins and sober up—then where'll you be?"

Now I would like to raise our sights a little bit to see what we can do, what the possibilities are. When we stop looking at these *if's* and *and's* so much, the chances are that when we drop our eyes they will be gone. This is the age of opportunities unlimited.

HUMANITY'S NEED FOR THE HUMANITIES

By CORNELIUS KRUSÉ

FIRST of all I wish to express my pleasure and delight at the honor of being asked to participate in this celebration of seventy-five years of signal educational achievement on the part of your great state university. I have also the honor to have been instructed only a week ago to convey to you the greetings and felicitations of the American Council of Learned Societies upon this important and memorable occasion. You may not realize that the American Council of Learned Societies in its entirety gathers up the twenty-three national organizations which represent the humanistic and liberal-arts interests of this country: organizations like the American Philosophical Association, the American Historical Association, the Political Science Association, and many others. It gives me peculiar pleasure to be able to convey to you this evening their felicitations.

The Council has realized increasingly in recent years that the humanities, if they are to have a significant impact upon American life and thought, must function in our education and especially through our institutions of higher learning. The American Council of Learned Societies, whose more appropriate name might be American Council on the Humanities, hopes in the future to establish even closer working co-operation with American institutions of higher learning than it has enjoyed in the past. There is in all branches of scholarship at the present time, I am glad to say, a very significant movement toward unity. Practically all of the national learned societies in this country, whether in the field of the natural sciences, of education, of the social sciences, or of the humanities are represented in Washington by four great councils: the National Research Council, the American Council on Education, the Social Science Research Council, and the American Council of Learned Societies. The executive directors and chairmen of these councils constitute the Conference Board of the Associated Research Councils which, beginning simply as an agency of consultation, is increasingly proving itself indispensable for the planning and execution of joint projects growing out of the common needs and

interests of the four councils. It is among scientists that one finds today some of the most persuasive statements regarding the present need for complementing the work of science and technology with greater stress on the contribution which the humanities can give to our present civilization.

As you no doubt realize, before and during the war there was much discussion of the meaning or place of the humanities in a free society and in our modern world. Notable regional and national conferences on the humanities have been held on the west and east coasts, and in the Rocky Mountain states. So great is the wealth of recent literature on the subject that it is sometimes referred to as the discussion literature on the humanities. A careful reading of these modern expressions of interest in the humanities and statements of what their role should be in modern times indicates a great shift in emphasis and temper from that encountered in earlier discussion. Briefly put, the contrast in temper may perhaps be stated in this fashion. The earlier discussions addressed themselves to the problem of how can humanity save the humanities; while today, in contrast, the question is usually asked in reverse: What can the humanities do to save humanity? In a less disturbed age the humanities seemed in peril, and their friends came gallantly to their rescue. Today, humanity itself is in peril and is looking wistfully to see if by any chance help may come from the humanities.

WE ARE all familiar, of course, with the events that have induced this great change of emphasis. You do not need to be told that we are living in a time when everybody who is at all thoughtful is possessed of a great sense of anxiety and urgency. It is those who are closest to a scientific knowledge of the overwhelming sources of physical power mankind possesses at the present time, who express the greatest alarm. This apprehension is perhaps best evidenced by the fact that a group of atomic scientists are publishing a journal for the education not of themselves but of the non-expert in what really is at stake for humanity in our present age. Certainly no man has been closer to the great recent accumulation of power through the sciences than President James B. Conant of Harvard University. In his recent Terry

lectures, "On Understanding Science," he refers to the necessity of intelligent citizens placing the international control of atomic energy at the top of any list of concerns, and he reminds us that if the United Nations Atomic Energy Commission should fail to reach agreement on the international control of atomic energy, "the prospects are grim, indeed."¹

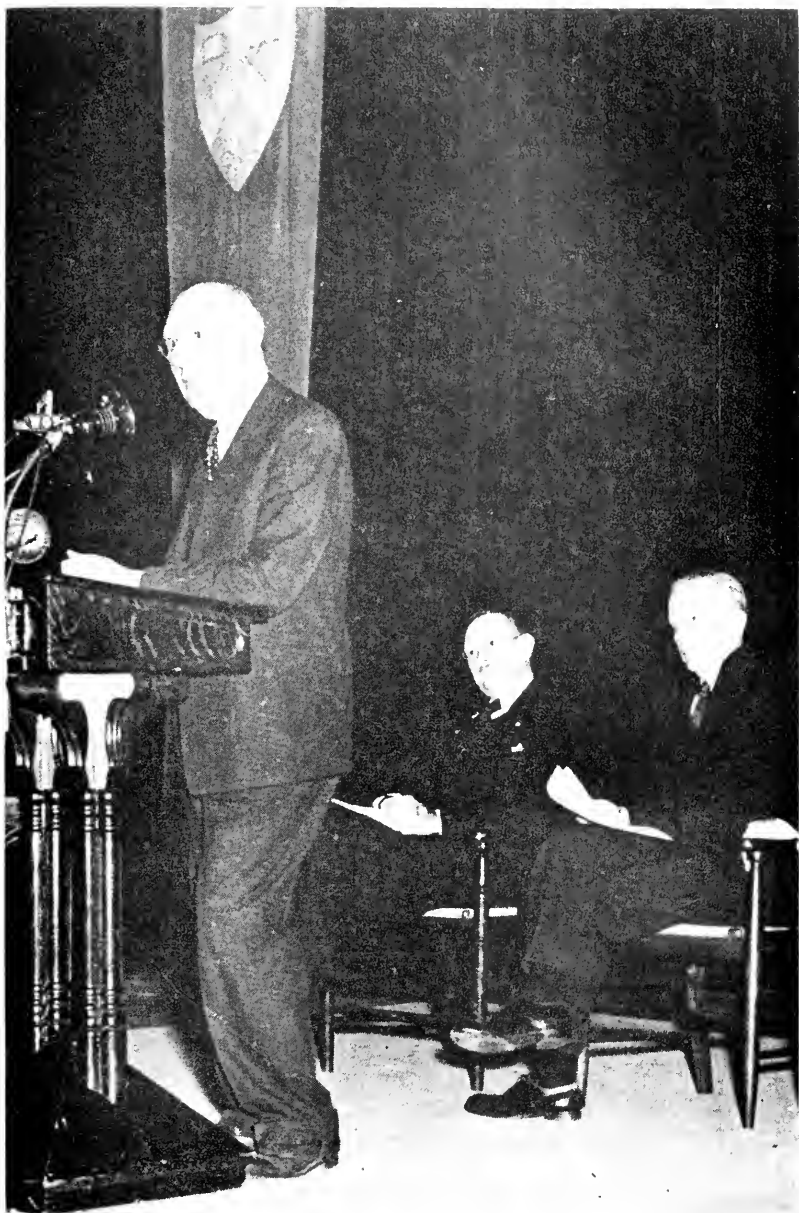
Along with this sense of urgency occasioned by mankind's sudden accession of terrifying power without adequate control of its use, there has come also, fortunately, a change in our attitude toward an understanding of the meaning of the humanities, a change without which the reversal of attitude referred to above could hardly have taken place.

When one examines the recent writings on the subject of the humanities, one discovers that almost every author is perplexed and baffled by the difficulties encountered in attempting to define the essence or the extent of the humanities. Now, definitions of terms that refer to objects of supposed common knowledge are notoriously very difficult. One is reminded of St. Augustine's famous statement with respect to the nature of time—something that is apparently very simple, a statement of almost unparalleled candor: "What, then, is time? If no one asks me, I know: if I wish to explain it to one that asketh, I do not know."² If inspired by St. Augustine's honesty to be equally honest, we should have to confess that we encounter similar difficulties when attempting to give adequate and definite explanations of such much used terms as science, philosophy, poetry, or art. Yet, however difficult, if we wish to discover what help, if any, can come to humanity from the humanities, we need to understand at least roughly what we mean by the humanities, even though precise definition may not be possible.

One of the simplest ways of letting people know what we are talking about is to point to something that is shared in experience. A definition based upon pointing at a class of objects intended is usually called a definition by enumeration. Within limits, such a definition is feasible and valuable even for an understanding of the humanities.

¹ Conant, James B. *On Understanding Science: An Historical Approach*. New Haven, Connecticut: Yale University Press, 1947. p. xi.

² *The Confessions of St. Augustine*. Book XI, Sec. 17.



CHARLES F. KLETTING, SPEAKING
SEATED: CORNELIUS KRUSE AND CHARLES E. MACQUIGG



GORDON KEITH CHALMERS, MILDRED HORTON,
AND REINHOLD NIEBUHR



KARL TAYLOR COMPTON

Most people would be agreed that the humanities are represented by the classical languages and literature, by literature in general, by the modern languages necessary to understand foreign literature more intimately, by history, philosophy, the fine arts, and religion. Whether the social sciences are also humanities is sometimes a matter of debate; but the fact that practically all the national societies in the field of the social sciences hold a dual membership in the American Council of Learned Societies and the Social Science Research Council, and the further fact that both councils are each year working in closer and closer co-operation with each other, would seem to indicate an increasing awareness that the humanities and the social sciences are closely related in both nature and function. If the social sciences are included, it would be easy to go a step further and include the natural sciences. This procedure would have the virtue of tolerance and wide-heartedness, but would seem for practical purposes to mean that the definition by enumeration had overextended itself to include all branches of learning.

Perhaps it would be wise to attempt a new approach in order to see whether one might not be fortunate enough to find a definition that would uncover the *essential* nature of the humanities. This undertaking, however, at once comes upon the difficulty that the term has had a history in the course of which it has undergone many changes in meaning, beginning with its reference to the so-called *litterae humaniores*, the humaner or politer letters in the period of the Italian Renaissance, when ancient history, philosophy, and literature were contrasted with the *litterae sacrae* or *divinae*, or the divine letters of the Christian Church. Since the humanities have picked up and dropped many meanings in the course of their history, it might seem somewhat arbitrary to select among them a favorite meaning which in the end might simply betray a personal preference. But whatever the meaning of the term may have been throughout its history, an analysis would reveal, I am confident, that the humanities have always been taken to refer to something that is or should be a very intimate concern of man. At its best, of course, the humanists, among them Montaigne, adopted the well-known humanistic creed of the distinguished Roman playwright of the second century B.C., Terence: *Homo sum; humani*

nihil a me alienum puto. It would seem fair to say that the humanities always wished to place man and his spirit in the forefront of interest. At their best and in their fullest extent they have referred and do refer to those human enterprises which lie closest to the hearts of men when they feel themselves to be most truly men. Unquestionably the term *humanities* contains within itself judgments of worth or value, as is, of course, corroborated by the clear value content in the related term *humane*. If pointing is again resorted to, one may say what is pointed to is man at his best, or at his noblest, when most aware of what it means to be a man. If all of the above remarks are valid, we could justifiably say, it would seem, that the humanities are the expression in manifold form—in art, in history, in philosophy and religion—of man's intrinsic values. Intrinsic values are those that give dignity and meaning to man and his life as contrasted with instrumental values like food, shelter, and raiment which minister indeed to man's necessities and come first in time but are not first in value.

SUCH a definition of the essence of the humanities as here proposed seems to me to have the virtue of making it possible to keep firmly in mind a central core of meaningfulness for all manifestations of man's intrinsic values.

The question might again arise: What of science in this connection? Is it not also an intrinsic value? Pure science, science understood as insight into the true nature of the universe and of man, unquestionably is an intrinsic value, and in its disinterestedness and purity has often commanded the admiration of men. I am not now thinking of scientific knowledge as imparting to man almost magical power for good or evil but as enabling man to come to know this mysterious universe. It occurred to me as I was hearing my distinguished predecessor, Charles F. Kettering, that it was his business to make the mysterious obvious and mine to make the obvious mysterious. I am reminded of the statement made by the celebrated French mathematician, Henri Poincaré, at the end of a long and brilliant analysis of the values of science: "Thought is nothing but a flash in the midst of a long night, but it is this flash which is everything."³ I regard President

³ Poincaré, Henri. *La Valeur de la Science*. Paris: E. Flammarion, 1920. p. 276. "La pensée n'est qu'un éclair au milieu d'une longue nuit. Mais c'est cet éclair qui est tout."

Conant's proposal that the history of science be used to make us more generally aware of the nature and value of science as essentially a proposal to include science in the humanistic enterprises. Science, when studied and presented humanistically, then, and not professionally, would indeed be included in the humanities and would be associated with what is usually accepted as the central core of the humanities, namely, language and literature, ancient and contemporary, native and foreign; the fine arts in all their varied expressions; philosophy; history; and religion.

If this much is granted me, it might be said that, of course, everyone understanding the term in this wide sense would now have to give immediate adherence to the proposal that there is nothing, literally nothing, that humanity, and particularly humanity the world over in our present anxious days, needs quite so much as the cultivation of that which is intrinsically most valuable in human life. And if it is granted that the humanities embody man's most cherished values, it follows by severe logical entailment, that the humanities by right demand first attention. Such an acquiescence in the proposal, if given, might give a humanist a glow of triumph, but the victory might prove hollow if the need of humanity at the present time for the humanities were not set forth in greater definiteness. This I will now attempt to do.

IN THE first place, it is hardly necessary for me to state, after the previous discussion, that I never refer to the humanities in the narrow sense merely of reviving the lost and often lamented art of proficiency in Greek and Latin. Not that great advantage would not accrue to students if more had a genuine command of the ancient languages and read the ancient classics in their original expression with pleasure and profit. Every true lover of the classics, however, will no doubt share Milton's feelings when he—himself a great lover of ancient literature—became indignant over the way in which Greek and Latin were taught in his day in England, and scathingly spoke out against the practice whereby, as he said, "we hale and drag our choicest and hopefulest wits to that asinine feast of sowthistles and brambles which is commonly set before them, as all the food and entertainment of their tenderest and most docible age."⁴

⁴ "Of Education." *The Works of John Milton in Verse and Prose*. London: William Pickering, 1851. Vol. IV, pp. 383-84.

As a lover of languages myself as keys to understanding, I can only parenthetically express sadness at the realization of the great amount of effort that has gone into the teaching and learning of ancient as well as modern languages without the student's often having tasted even once the joy of entering into an understanding of alternative ways of conceiving life. Fortunately, more is being done these days to facilitate the more successful acquisition of ancient and modern languages. The narrowness of the conception of the humanities that once prevailed as restricted to the learning of Greek and Latin dare not, however, obscure the important insight contained in this practice, namely, that knowledge of the past is always important, and especially the knowledge of man's cultural past.

It certainly is true that ignorance of the past involves a great impoverishment of man's realization of what life can be, and is a tragic hindrance to achievement of that knowledge of self which wise men have always extolled as necessary for significant living. To live as if Plato and Aristotle had never lived before, or as if Virgil and Lucretius had never written epic and philosophical poetry; to accept present-day Christianity without any knowledge of its primitive manifestations and importance to mankind throughout the ages; to live as if a Phidias had not lived before, or the builders of the great cathedrals in France and England; to listen to modern music without a realization of the beauty of Gregorian chants and of the church music of Palestrina or of Bach; to live without an intimate appreciation of the great religious and secular painting of the past—is certainly to live a life that is immeasurably less than it might be.

When I had the great good fortune recently of visiting the justly celebrated Huntington Library in San Marino, California, and requested and received the privilege of inspecting some of their great treasures of the sixteenth and seventeenth centuries, I felt that the separating span of three hundred years and more had vanished as if by magic, and I had become a contemporary of Hobbes and Bacon. Remembered phrases took on fresh meaning when seen in the ancient print which greeted their first readers. In leafing through Bacon's *Essays*, first published in 1597, I came with fresh interest upon his well-known analysis of the uses of learning: "Studies serve for delight,

for ornament, and for ability." We think of Bacon's day at the time when he made this analysis, as days of Elizabethan magnificence—yes, but also of insecurity and turbulence. What with plots and counterplots, attempted rebellions, and consequent executions of their leaders, one hardly expected to find learning extolled either as a pastime or as an ornament.

Now, it is indeed true that studies of all kinds, humanistic and scientific, may serve for pastime and for ornament; but serious students in our day are not in the mood to indulge such uses of studies. Certainly the least value of the humanities in our present day is their value as ornaments. In fact this value, in my judgment, has hindered the humanities from playing the part reserved for them in human history. If "pastime" means delight, the judgment has its merit. Delight is usually the accompaniment of successful achievement, and living in companionship with the best that has been thought and written and presented in the manifold expressions of art, should by right be treasured. But in an age of urgency attention should be more properly focused upon what the humanities can do for humanity.

ONE thing that is needed sorely at the present time, it seems to me, is serenity and stability. A knowledge of the past may contribute to the realization that civilization has frequently been confronted with great crises and that it has been possible for man, or at least for some men, to meet these great crises with courage, imaginativeness, wisdom, and dignity. A person who feels that he is a contemporary of the great men of earlier days is not so easily rushed off his feet by every wind of doctrine which may arise from day to day. It is surprising how frequently a certain vogue will seize the contemporary world as if nothing similar had ever appeared before. When, for example, I hear people speak about semantics in hushed tones as if it were a completely new discovery, I wonder to what profit they have read the so-called lesser dialogues of Plato with their careful examination of the meaning of current terms like piety, courage, temperance, and friendship. Many of our modern fears are well founded, but there are also fears that come from living constantly with headlines of newspapers or of radio broadcasts with their cultivated breathlessness. Now, newspapers and

broadcasts are important and instructive, but, to have understanding, more than a day-by-day account of events is necessary. Yet I am told by persons who make a study of such things that for many of our contemporaries the newspaper is their only reading. History is often sober, and sometimes dull, but is it not evident that without its history any event is but superficially understood? Is it not evident, for example, that anybody who has any knowledge at all of the political and cultural history of Russia, cannot possibly adopt toward the Russian people the attitude taken by those who rely solely upon press or radio reports of the daily behavior of Vishinsky and Molotov for their knowledge of the Russian people? It is certain that if Germany is to be not only economically but spiritually rehabilitated, she will be greatly helped, perhaps helped only, by a remembrance of her great past when she listened to her philosophers like Leibniz and Kant; to her poets like Goethe, Schiller, and Heine; and to her great music masters like Mozart, Bach, Beethoven, and Brahms. For Germany certainly there will be healing in an appreciative return to the heritage left her in her days of cultural greatness, which, it will be remembered, coincided with a low degree of political or imperial power. It is well for us in our day to repossess the heritage of our American past and feel a sense of solidarity with those who in many fields laid not only the political but also the spiritual and artistic foundations of our culture.

It is important that man be related to the best achievements of his fellows in the past of his own tradition, but this is only a part of humanity's great need for the humanities in our own day. We must become contemporaries not only of persons who have advanced the meaning of life and of human dignity in the past in the western world, but also in the world at large. Time was when any teacher of philosophy thought he was engaged in the most sweeping survey of any course in college. We customarily begin with pre-Socratic Greek philosophers in the sixth century B.C. and study the development of philosophy from that time until the present. Indeed a great span of years. We have, however, almost completely omitted Arabic, Indian, and Chinese philosophy. We have simply studied the philosophy of the European peninsula which might today be called the "sore thumb" of the great Asiatic mainland. I suspect that in other fields of the

humanities something similar has happened until recently. Our penetration in depth in time must be made to include also the special extension of a knowledge of the best that has been thought and done in the cultures of peoples who, in comparison with the western world, constitute an overwhelming majority of the two billions or two billions and a half who are now our contemporaries the world round. Political isolationism has been overcome, we sincerely hope, and science by its great magic has made of this world externally one world. But inwardly it is anything but one world. Just at the time when science is knitting the races of the world together through an increasingly more amazing network of communications in person or by word, whether written or spoken, the world tends to fall apart. Why is that? It is easier to bring people together in a neighborhood than to make them be neighborly and understand each other. Aristotle in his celebrated *Ethics* makes the statement that the will to friendship is a matter of a moment, but not friendship. Similarly the will to have one harmonious world engaged in co-operatively advancing the welfare and meaningfulness of human existence, in enjoying each other's contribution in art, in literature, in philosophy, and in religion may indeed be a matter of a moment among people of good will, but not really the actual achievement of a sense of solidarity and of a community of interests and aspirations. We must do vastly more than smile at each other. Good will is a prime necessity, but it is not enough. We must also understand each other. It is impossible to begin to understand the peoples of the East, near or far, without a penetration into their art, their literature, their history, their religions. This I know is a great order; and one of the great problems of higher education, now and in the future, is how best to develop our knowledge of the great heritage of the past of cultures other than our own and to transmit this knowledge to the young. It will mean vastly more effort on the part of both the teacher and the taught. As I tell my students, the time of the playboy is gone. Whether or not we wish to lead, leadership has been thrust upon us, and it is necessary that American youth rise to the challenge of leadership. The old days when we were simply interested in sports and a gentlemen's degree have gone completely. It will mean vastly greater expense in introducing into research and into teaching, subjects in the

fields of art, literature, philosophy, and religion, which hitherto have been conveniently neglected. Nothing at the moment is, however, quite so important as to develop as quickly as possible a sense of world community. World government, which everybody admits is the only final answer to the control of atomic energy, will never have even a chance of becoming a reality without the sense of kinship that comes to different peoples through an appreciative understanding of their several cultures.

I HAVE stressed the necessity of venturing sympathetically and appreciatively into the past humanistic expressions of other people, but we must not forget that the past is of importance only as it contributes to the present. A knowledge of the contemporary literature and art of countries like Russia and those of the Near and the Far East is also an absolute necessity in our own day. I am proud to have been and to be associated with the American Council of Learned Societies, a Council which has with rare foresight done so much in the past decades through the medium of fellowships, conferences, institutes, and translation projects to help open up to a greater number of scholars and students the whole field of Chinese learning and a knowledge of China's cultural past. In the near future the Council hopes to make similarly available for appreciative understanding the culture of the Arabic world and of the peoples of the Near East. I am proud also of the exceedingly important Russian translation and book procurement program of the Council which is carried on at the present time with generous grants from the Rockefeller Foundation, and which is contributing so significantly to make standard and current writings of Russian culture available to our scholars and students. I have only admiration for the numerous universities this country over which have begun to see the responsibilities of the present day and are establishing Russian institutes, Far East institutes, and Near East departments.

Fundamental to the success of such efforts is the removal of the language barrier. Language, I recognize, is only a tool, but to learn the languages of other countries is a necessity if humanity's need for the humanities is to be met. Fortunately, there is available for the

greatly accelerated learning of a language the intensive method worked out with great skill during the war by distinguished linguists under the auspices of the American Council of Learned Societies. This method, which proved so successful in the armed forces, demonstrated once and for all that American young people are as capable as those of any other country of mastering a language if it is properly taught and—more important still—if they have the will to learn and see the reason for its necessity. We studied languages to win the war. Can anything be more important than to learn languages to win the peace and to help to establish a new sense of world community?

It is difficult to overestimate the need for a complete reversal of our previous unconcern about learning foreign languages. New York City, according to a recent report in the *New York Times*, has recognized the need for more extensive language training and plans to begin the teaching of modern foreign languages in the seventh grade. Students who are particularly apt will be given intensive instruction for six years. We speak much of iron curtains in these days, and unfortunately they exist. But may I suggest that most of them are of our own devising: curtains of indolence, curtains of disdain, curtains of thinking that we ought not to waste our time on things foreign.

The dividing curtain of language is the first barrier that needs to be removed if we are to enter into more than casual communication with our neighbors the world round. No one person can learn all languages, but it is difficult for me to understand how those of us who eagerly look forward to a world of comradeship and friendship can expect that if any language is ever to be learned it must always be our own, the English language. A mastery of any foreign language admits us to a unique sharing of the great expressions of the human spirit in that particular culture. Anyone who has once experienced the joy of entering directly into the heritage of the past of another people and into direct communication with their present concerns and achievements needs not be told how precious is the reward of every effort, however great, to earn the right of such a privilege. We cannot, I have said, learn all the languages, but someone must learn some so that in the aggregate the cultures of all great peoples, whatever their language,

will become accessible to those who realize how the sense of world community depends literally upon sharing values held dear in the diverse cultures of mankind.

We hear much of "realism" in our day, and by it, one gathers, is meant achieving a semblance of world co-operation by some display of force, whether it be economic or military. But was it not a military chancellor, greatly experienced in the uses of force and their limits, who said, "You can do everything with bayonets but sit on them"? There is much power abroad in the world at the present time but little understanding. And nothing is quite so necessary in our day as an increase of understanding. What kind of understanding is it that we need? Knowledge, indeed, but not simply knowledge, for one may know much about a people and yet not know them, as a foreigner may live a long while in this country, or we in his, without feeling at home. It is only through an intimate and sympathetic appreciation of the history, art, literature, philosophy, and, if the country be religious, the religion of a people that we achieve this coveted feeling of being at home with them. In a fascinating exotic dress we then may recognize our own cherished values or, what is also a great gain, we may come to appreciate and in time to adopt values our own culture had overlooked. Some such mutual appreciation of values that seem, or are, diverse in cultures other than our own is necessary to bring about the one world of friendship we should be striving for. But only close contact with the humanities of a culture can induce it.

IN CONCLUSION, then, may we not say that a new day has dawned for the humanities, a day of ministry to man's most serious needs. We who cherish the humanities, however, need also to see and remember that in serving, and not in being served, the humanities achieve their greatest dignity. No longer are they to be cultivated as orchids or to be considered as the mere ornaments of life. The humanities, we now see, must bake bread for humanity, for humanity has dire need of it lest it perish.

Institutions like this great state university can do much to make it possible for the values inherent in the humanities to become avail-

able not only for a chosen few but for that part of humanity that is within its keeping. If not only in this state, but in this country generally, and not only in this country but in all countries, the great value of the humanities for humanity, and humanity's great need for the humanities are duly appreciated, and if the many perplexing and challenging problems involved in their study and communication are successfully met, it may still be possible to say, even at this late date, in the words of a great Greek poet, how amiable is man when he is really man.

THE SECOND CONFERENCE

Chairman:

JEFFERSON B. FORDHAM, Dean, College of Law, The Ohio State
University

Speakers:

ROBERT LAWRENCE STEARNS, President, the University of Colorado
W. W. WAYMACK, United States Atomic Energy Commission

OPENING REMARKS

By JEFFERSON B. FORDHAM

AS CHAIRMAN of this conference, I have the privilege of opening the third session of the seventy-fifth anniversary program of The Ohio State University. It is quite customary for lawyers to deal with their subject matter in terms of substance and procedure. Other people do the same in their disciplines. Sometimes we find it is not too easy to determine where substance leaves off and procedure begins. This morning, however, the question presents no problem, for I am quite certain that my province is procedure.

I do wish to make a preliminary remark. As one who has come but recently to share in the work of this great university and who thus can claim no credit even in a modest way for what it has accomplished in the past, it would not be unbecoming for me to join in paying her richly merited tribute. I am happy, however, that in the inspiring sessions that have preceded this assembly a loftier tone has been set. While just recognition has been accorded the University for what she has been and for what she is, the greatest stress has been laid from the outset upon her responsibilities and opportunities both for the present and for the future.

In these days of chronic national crisis, and unprecedentedly rapid social change, the responsibilities of our centers of higher learning are increased immeasurably. Particularly is this true of the state institutions which have such close ties to the mass of the people. I am confident that the addresses we are about to hear will aid us greatly in achieving the perspective and declarative purpose demanded by the great tasks of today and tomorrow.

Our first speaker, Robert Lawrence Stearns, was born in Halifax, Nova Scotia, to parents who were citizens of the United States. Since the family moved to Colorado when he was but two months old, I think it not unfair to our good Nova Scotia friends to say that he is in truth a native son of the state whose splendid university he now heads. It was at the University of Colorado that he did his undergraduate work. After graduation, he enrolled in the Columbia Uni-

versity Law School, from which he graduated with an LL.B. degree in 1916. That same year he was admitted to the Colorado bar and entered practice in its capital city of Denver. Although his distinguished career in the field of higher education began when he served as an assistant in history in his undergraduate days, he actually cast his lot with the teaching profession when in 1920 he accepted appointment to the faculty of the College of Law of the University of Denver. He attained professorial rank in 1924. Seven years later he became a professor of law at the University of Colorado. In 1931-33 he served as acting dean of the law school. In 1935 he assumed the deanship. He continued in that capacity until he was elevated to the presidency of that university in 1939. As a lawyer and a legal educator, he has shared prominently in the work of the organized bar. He has been president of the Denver and the Colorado bar associations. Since 1937, he has been a member of the Council on Legal Education of the American Bar Association. His published writings include a compilation of the Colorado Law of Wills and Estates, and numerous contributions to legal periodicals. He is a member of the Phi Beta Kappa and of its legal counterpart, the Order of the Coif. He served his country in two world wars. In World War I, he rose to the rank of captain in army aviation. In the recent conflict, he rendered distinguished service as an operations analyst with the Army Air Forces.

In 1946, he was awarded the Medal of Freedom. Today he continues as a member of the Board of Visitors of the United States Air Force Air University. In well-merited recognition of his notable work and his influence as an educator in the realm of higher learning, Columbia University, the University of Denver, and the University of New Mexico have conferred honorary degrees upon him. President Stearns is to discuss the highly appropriate subject, "The State University—A Service to Democracy."

The second speaker on this very significant program, William Wesley Waymack, is a native of Savanna, Illinois. His college days were spent at Morningside College from which he graduated in 1911. Three years later he became associated with the *Des Moines Register* and *Tribune* as an editorial writer. That was the beginning of a journalistic association which continued until the recent assumption

of his present weighty public responsibilities led him to sever his private, professional ties. He became managing editor of his paper in 1918 and editor of the editorial section in 1921. In 1942 he assumed the important responsibilities of editor. In the realm of management he became a director of the Register and Tribune Company in 1931 and vice-president in 1939. His stature as a journalist is fittingly attested by the fact that in 1937 he was awarded the Pulitzer Prize for distinguished editorial writing.

He has had an equally notable record in the public service. He has been a member of the Board of Directors of the Federal Reserve Bank of Chicago. His contributions to the cause in World War II have included service to the State Department as a consultant to the War Food Administration and as an associate public member of the National War Labor Board. In 1941 he made a study of the Australian war effort at the behest of the Australian and New Zealand governments. Our speaker is a member of the governing boards of the Carnegie Endowment for International Peace, the American Association for the United Nations, Freedom House Inc., the Woodrow Wilson Foundation, and the National Conference of Christians and Jews. The National Conference awarded its distinguished service citation to him in 1942. In 1946, he was in Greece serving as a member of the Allied Mission to observe the Greek elections. In October of that year, he was appointed to membership on the newly created United States Atomic Energy Commission and since that time has been sharing with his colleagues responsibilities of unprecedented gravity to all mankind. Upon this conspicuously able and fruitful citizen, no less than four institutions, including his alma mater, have conferred honorary degrees. It is our rare good fortune to have him address us upon the subject "Education for Survival."

THE STATE UNIVERSITY— A SERVICE TO DEMOCRACY

By ROBERT LAWRENCE STEARNS

As THE tide of democracy moved westward across this continent it marked our institutions of higher learning with characters as distinctly American as the Lincoln Memorial. From the Atlantic Seaboard to the Northwest Territory to the Rocky Mountains, men and ideas have blazed the trails and built the outposts of freedom. If you would seek their monument look about you. Since revolutionary times we have been moving to the measures of their great thought—"the people are the government."

This occasion commemorates the establishment of such an institution. It marks another step in the sequence of public concern over what had previously been regarded as private matters. The growing needs of the country required federal control for the establishment of a monetary system and a postal system. Homestead laws encouraged the migrations of people and their settlement upon public lands. Communication and transportation needs resulted in governmental assistance to railroads and telegraph lines. As new roads were opened up to the westward, they were protected by federal military forces.

But education had been essentially a matter of private or local concern. Originally dependent upon private benefactors or the efforts of the church, provision for education came with this westward migration of democratic ideas to be a matter of state concern—first for the public schools and later for the state universities. The first president of the University of Minnesota declared this principle in his inaugural address. "Minnesota," he said, "cannot postpone her university until some public-spirited millionaire comes down with the needful millions There remains but one resource. The State, the Commonwealth, the sovereign people in their organized political capacity must found the university. . . . The University . . . is not merely from the people, but for the people."¹

¹ Folwell, William Watts. *University Addresses*. Minneapolis, Minnesota: The H. W. Wilson Company, 1909. pp. 40, 41, 75.

That each successive state university has become such a dynamic force cannot be denied. As Clarence Dykstra, former president of the University of Wisconsin and now provost of the University of California at Los Angeles, said from this platform eight years ago: "It was in this spirit that here in the old Northwest the pioneers set up their universities and nowhere in the world have universities played as large a part in the life and growth of the people." It is this quality of responding to the needs of the people as those needs change that marks the peculiar genius of the state university.

Of necessity, therefore, the responsibility for meeting the educational needs of the maturing nation fell upon the state universities. The traditional required curriculum was expanded. Professional schools of law, medicine, and engineering were established; later their number was increased to include business, journalism, pharmacy, architecture, and many other fields. Vocational training and college work were united in the same institution. The Morrill Act (concerning which we have heard so much in the last day) whereby the so-called land-grant colleges came into existence following the Civil War, encouraged and fostered studies in agriculture and the mechanic arts.

But what is behind this theory of public support for education? We have seen studies almost without number made on the subject of the increased earning power of the individual with the college degree. If we read these magazine and newspaper articles with their statistical approach showing the annual per capita earnings of the college graduate as against those of a person who has not had that opportunity, we are led to believe that the sole purpose of a college education is to increase the economic status of the graduate. Nothing in my judgment could be farther from the truth. The fundamental purpose of state support of higher education is to provide for the common welfare. If the vast sums that are spent annually for the construction and maintenance of these great institutions have for their only purpose the advancement of the economic status of the individual, we have lost sight of the basic philosophy of their creation. State universities are created and supported to sustain the democracy, to raise its level of political literacy, to create and develop the informed intelligence—in short, to provide an agency whose main purpose for existence is a

service to the democracy which it sustains. No nation can exist half slave and half free, and no bondage is greater than slavery to ignorance, superstition, and incompetence.

Out of the public need was this great institution born. It and others like it have consistently tried to measure up to the great purposes and obligations that brought them into being. The changes that have come about in the intervening years are but the logical application of the idea of service to democracy. These changes are so great and so significant, however, as to merit consideration of them and their effect upon our people.

Let us therefore consider briefly the major divisions of a modern university, take stock of some of their accomplishments, and then contrast the state university today with what it was seventy-five years ago.

THE College of Arts and Sciences is, and always has been, the very core and center of any university. The rest of the institution is but its lengthening shadow. It is here that the intellectual curiosity is awakened and the habits of inquiry are formed. Our American universities have gone through the processes of the fixed curriculum, the free elective system, the group elective system, and are now emerging into the plan of general education. Whatever the device employed, its purpose is to develop an intelligent and socially sensitive person, able and willing to discharge his responsibilities as a citizen, a community member, a family member, and a friend. Presumably he should be equipped with interests and powers to give meaning and satisfaction to life.

The aim of this college is best summarized by the statement of Isocrates written about 350 B.C. as contained in the Norlin translation:

Whom, then, do I call educated . . . ? First, those who manage well the circumstances which they encounter day by day, and who possess a judgement which is accurate in meeting occasions as they arise and rarely misses the expedient course of action; next, those who are decent and honourable in their intercourse with all with whom they associate, tolerating easily and good-naturedly what is unpleasant or offensive in others and being themselves as agreeable and reasonable to their associates as it is possible to be; furthermore, those who hold their pleasures always under

control and are not unduly overcome by their misfortunes, bearing up under them bravely and in a manner worthy of our common nature; finally, and most important of all, those who are not spoiled by successes and do not desert their true selves and become arrogant, but hold their ground steadfastly as intelligent men, not rejoicing in the good things which have come to them through chance rather than in those which through their own nature and intelligence are theirs from their birth. Those who have a character which is in accord, not with one of these things, but with all of them—these, I contend, are wise and complete men, possessed of all the virtues.²

The attainment of this ideal of Isocrates is difficult and baffling. Of necessity human instrumentalities must be used. Faculty members are sometimes interested in the narrow fields of their own specialties and like other humans are oftentimes intolerant and contemptuous of the opinions of others. The tendency is always toward the disintegration of learning rather than toward its integration into a meaningful whole. The one movement today that gives hope to the situation is the theory and the development of a general education whereby the student can be led through an appreciation of the past into the present, and will gain an understanding—broad, if need be—or at least an awareness of man's relation to his environment in all of its aspects—physical, social, economic, governmental, and international.

It may be said that this is a large order. It is. It has been the aim and purpose of education through the centuries. The story of its failures is told in wars, conflicts, depressions, unemployment, pestilence, and famine. The story of its successes is told in the periods of peace; in the conquest of nature; in conservation of resources; in creative works in art, architecture, literature, and music.

"Say not that the struggle naught availeth."

THE School of Law as a part of the state university structure was established as a result of a great social need. No society can survive without a stable but resilient legal system. If too inflexible, as were the laws of the Medes and the Persians, the laws will not respond to human need and will become an end instead of a means to human betterment. If too flexible, they create chaos and uncertainty, denying

² *Isocrates*. With an English Translation by George Norlin. Vol. II, pp. 391-93. The Loeb Classical Library. London: William Heinemann, Limited, 1929.

the very quality that law is designed to provide. "There must be," said Roscoe Pound,

a balance of what is and of what ought to be. No one can study the history of precepts and conceptions and doctrines without seeing that in law what is is constantly reshaped to the model of juristic pictures of what ought to be. Yet we cannot ignore what is. It is just this which has to be reshaped. Ideals do not realize themselves. Men make them real by measuring and criticizing precepts, in their content and in their operation, by . . . taking them as goals of creative thinking. A body of legal ideals not put into such use is wholly sterile. It is a difficult feat to reconcile and bring to one system of juristic thought stability and change, authority and reason, is and ought to be, rule and discretion, legislation and administration, statutes and doctrinal and judicial tradition. But such is the task of a science of law in a period of growth and adaptation. Because we have to do with what ought to be we are not to ignore what is. Yet our occupation with what is has its justification in enabling us to establish what ought to be.³

Our modern state university law school is set up on this theory. Those words quoted from Mr. Pound were spoken at the dedication of the Law Quadrangle at the University of Michigan in 1934. They reflect the basic philosophy of legal education today. It is imperative that our law schools educate their students in the subject of law as it is. Without that knowledge they would be of scant use to their clients. But these men and women are not concerned to be only practitioners of law. They are the future judges, legislators, and jurists. Without possessing critical faculties and using them to evaluate what is, they would be of little benefit to society in remaking the law through the processes of judicial and legislative evolution into what ought to be.

The products of the law schools of our state universities are in every court and every legislative body in the land. The welfare, not only of their individual clients, but of society as a whole is dependent upon how well they perform their tasks of judicial development.

The enlightened approach of the law school of this university to the problems of today is very evident. Not only does it provide for the legal education of the lawyers of tomorrow, but it is developing their critical faculties as well. Through its *Law Review* it is encouraging

³ "Law and Laws in the Twentieth Century." *Dedicatory Exercises of the Law Quadrangle . . .*, June 15, 1934. The University of Michigan Law School, 1935. p. 41.

creative scholarship. Through its course in the legal aspects of labor relations, it is pioneering in a field of vast importance to our internal development. Legal change comes slowly, often only after the need is acutely felt. It must be the product of thorough and scholarly effort, articulating attitudes and composing differences. Such an activity calls for statesmanship of a high order.

Moreover, as this nation moves toward the assumption of its duties and the fulfillment of its destiny in the family of nations, the creation of an effective body of international law is imperative. The United Nations is but an association of political entities. It has no legal cohesiveness. The next step in its development is and must be a legal foundation deserving the respect of the constituent nations and demanding compliance with its principles, with power to enforce them if need be. Where can we look today for men competent to design such a structure if not to the members of the legal profession? Let courage rise to the danger, but let it be the courage and resourcefulness of the Anglo-American lawyer familiar with the legal tools of a workable democracy.

IN NO field have the contributions of the state universities been more immediately felt than in medical education. Out of the 77 Class A medical schools in this country, 29 are affiliated with state-controlled universities. Indeed, today the cost of medical education has grown to such a figure that state support is almost a necessity.

The amount of detailed knowledge necessary to the effective practice of medicine today has created the age of specialists. Of necessity these specialists are drawn to the large urban areas. The age of the general practitioner is waning; and many communities in our states have inadequate health care in terms of doctors, nurses, and hospitals, and of the large and varied groups of skilled technicians essential to their work. Changes in the methods of medical education require more extensive laboratories, more clinical material for bedside instruction, and less didactic teaching. The medical profession, which has given greatly of its time and talents to teaching in our medical schools, now finds the pressure of practice permits less and less opportunity to teach. More and more full-time teachers are now required to do the job that

used to be done by volunteers. All of these factors tend to increase the cost of teaching and to diminish the numbers that can be properly taught.

Moreover it is essential that our medical schools increase their output in numbers as well as in quality if the demands of individual health are to be met. It is equally essential that our state university medical centers work with the state and local public health authorities if the problems of sanitation and public well-being are to be solved.

In no place which I have visited has there been more awareness of this vital need than at The Ohio State University. Your great and growing medical center, with its intelligently conceived program, combines the education of doctors, dentists, nurses, pharmacists, and technologists, with the highest professional research. The education of men and women in the science and art of healing is here combined to a marked degree with a study of the underlying causes of disease and ill health. The state of Ohio is supporting this great undertaking which will not only benefit the state through the well-being of its own citizens and communities, but will contribute to the benefit of generations yet unborn, here and elsewhere.

Moreover, the members of the profession are themselves awake to this critical condition in many localities. They are putting their support behind the universities in their efforts to provide adequate facilities for increased student bodies and regional hospitals to improve local facilities. In at least one institution I know of, the subject of general medicine is being taught as a specialty and is ceasing to be regarded as a stepchild.

Never since our very earliest history has the need for doctors been so great. The medical schools of the country are trying valiantly to meet the need; but with the increase in our population, with millions of new family units established since the war, with the increase in the average life span, with the conquest over many forms of disease and the recognition of many others, a new and a vigorous look is needed into the whole field of medical education. As the frontiers of medical science are pushed back the horizon widens. Here today is one of the greatest challenges to American professional education, public and private alike.

ONE of the fundamental bases for the establishment of this and other great land-grant institutions was the provision for agriculture and the mechanic arts, for experiment stations, and for the general meeting of the needs of rural communities. As time has gone on this function has expanded with the growth of our population and the complexity of our living to provide not only farmers but agronomists, not only mechanics but engineers, not only experimentalists but research scientists of the highest order. Graduate work in agriculture at The Ohio State University is recognized across the country as of an exceptionally high order which contributes not only to the welfare of the state, but to the benefit of mankind.

Indeed it may well be doubted if Senator Morrill, when he proposed the bill which was passed in 1862, could have envisaged the great institutions which have grown up under its influence as agencies of public welfare. We hear much today of the danger of federal aid to educational institutions. If the operation of the land-grant colleges is any criterion, a pattern has been set whereby the autonomy of the institution is preserved in spite of the fact that a portion of the operating funds comes from federal grants.

But it is basically important that this autonomy be preserved. The state university is in a strategic position to know and to meet the needs of its locality. It should preserve and develop the peculiar genius of our people for solving their own problems. If federal assistance to education is granted, it should never be at the price of local control.

Closely allied to the previous topic of agriculture is the subject of engineering education and the application of scientific discoveries to industrial development. Whether the field is agriculture or civil, mechanical, chemical, electrical, or aeronautical engineering, the function of the state university is evident. Since World War II the demand for skilled persons in these fields continues unabated to take up the slack of the fallow period during the war. So great are the demands upon the students in these fields and so short is the period of undergraduate preparation that the real danger lies in the inadequacy of their general education. The Society for the Promotion of Engineering Education has given and is giving serious consideration to this problem. It is definitely to be hoped that some provision may be made to

improve the situation by lengthening the average curriculum to five years, as has been done in large part at this institution, or by providing periods of internship after graduation so as to permit in the period of undergraduate study more time for the proper study of mankind.

The graduates of our technical schools should be citizens first and scientists second. It is no bargain to graduate ignorant specialists. A university graduate today in any field should have upon him the mark of the broadly educated person as well as possess technical competence. "Who knows only his own generation remains always a child."

The number and the complexity of professional schools in our universities today are as broad as the needs of society: teaching, business, pharmacy, art, music, and so on through the category of human interests. These subjects are highly proper functions of state universities. But in some instances the movement has gone far beyond the usually accepted categories appropriate to institutions of higher learning. Indeed there are today so many activities taught in some of our universities (not this one, happily) involving skills rather than knowledge that you wonder if the pendulum is not swinging too far in the direction of utilitarianism. What were once seats of learning have become little more than trade schools, and the criteria for the introduction of new courses is not the intellectual content of the subject matter but an overemphasis on the economic opportunity for the graduate. This tendency seems to be the outgrowth of our emphasis upon individual rather than community needs.

WITH the growth of function of the state university has come the development of the graduate school which cuts across practically every branch of learning in the institution. It is the incubator for the great research programs that are developing with renewed vigor since the war. There is a noticeable tendency, however, in the expansion of the work of graduate schools to provide a multiplicity of degrees. The danger here is as severe as is the danger of the disintegration of education under the free elective system. The correlation of advanced studies under the Ph.D. program is well recognized and wholesome, but the tendency is all too frequently to provide specialized education in a particular field and to ignore the broad cultural back-

ground that should characterize the doctor's degree in whatever field it may be granted.

Basically, however, the graduate school in our American universities is responsible for one of the most wholesome discernible symptoms of modern education—the development of the creative capacity of the individual student to do independent and creative research. It is here that the marked achievements of America in the scientific world have begun. To the graduate schools of the American universities the country owes an enormous debt for the expansion of the horizon of human knowledge.

We may well inquire, as no doubt many of us have, as to whether or not the program of scientific research is carried on at the expense of teaching our undergraduate students. So far as I am aware the universal experience is that a well-conceived research program instead of interfering with teaching, actually enhances it. Creative minds are retained on the faculties. Opportunities for graduate instruction are greatly multiplied. Student interest is aroused and maintained as never before. And last but by no means least, the boundaries of human knowledge are expanded to the eventual betterment of mankind.

The one danger of the progress is the tendency toward imbalance. The major part of university research today is in the field of the physical sciences; whereas the need is greater than ever before for more understanding in the field of the social sciences, in economics, in government, in labor relations, and in the international aspects of all of these subjects. That this imbalance may be corrected, that we may learn to understand all we know and to put it to constructive uses is the consummation devoutly to be wished.

The condition of which I speak is exemplified by the emphasis upon the physical sciences and is an understandable but an alarming consequence of the impact of the war upon our civilization. Concerned as we have been with the preservation of the nation and our survival as individuals, of necessity we have turned to the creation of instruments which lengthen the arm and enhance the power of the individual. These instruments have been developed by the growth of science and by its application to the widest extent yet attained in the history of mankind. We have encouraged scientists in every laboratory

in the nation to advance their discoveries and to perfect the means of their application in order that they might be used for purposes of destruction. The result of this has been greatly to overemphasize the destructive powers of scientific discoveries; we blame the results on the discoveries themselves rather than upon the use to which we have put them. Atomic fission is of itself neither moral nor immoral. It is of itself an example, and a most tragic one, of mankind's knowledge of, and control over, his physical environment. It is unfortunate, to say the least, that the brilliant scientists who participated in the work of this discovery possess a sense of guilt and are almost impelled to apologize for the results which have been called into being from their efforts.

THE obvious fact is that as a people, we have not yet attained a maturity in our capacity to resolve the social and governmental affairs of men commensurate with our maturity in controlling our physical environment. Clearly, then, the need for the future of mankind is emphasis upon our social, economic, governmental, and international relations. Clearly, as we heard from a distinguished scholar last evening, humanity's need is for the humanities.

As a place where people of all races, creeds, and environments gather for study, the university is the ideal location for the conduct of this endeavor; but if its work in this particular is to be effective, it cannot be confined only to the students of the coming generation. The need is immediate. If public opinion is to support progress in international relations, it can only be developed through agencies of adult education and by arousing the public consciousness to the dire consequences of a cold war which later may possibly be heated to the boiling point.

Efforts have been made in this direction by appealing to the fear impulses of our people. Books, speeches, plays, and radio programs have been designed to frighten the American populace into a state of mind which will make them receptive to the brotherhood of nations. Such an endeavor, in my judgment, is doomed to failure. It may dramatize the need but it cannot change the heart. Not until a reasoned judgment compelling action, has been reached, will the agencies

of international relations be modified to effectiveness; and not until the will of the people, acting through their representatives, is based upon legal rather than political consequences, will a stable order be reached in international affairs. We must, therefore, emphasize more than ever before, the importance of the need for research, study, and education in human relations the world over.

How evident it is that the state university of seventy-five years ago with its small beginnings, its classical curriculum, and its limited campus has become an instrument in the lives of people and of service to the democracy. Coming from the people, it must, if it is to justify its existence, give back to them in an increasing measure its knowledge of the past, its sense of values for the present, and its hope and aspirations for the future. This one in particular, Mr. President, has well and truly served the people of its state and nation. If I were to ask my colleagues among the state universities of America, I am confident that they would say with me to The Ohio State University, "Well done, thou good and faithful servant."

EDUCATION FOR SURVIVAL

By W. W. WAYMACK

PRESIDENT BEVIS, when writing me with reference to the subject matter of this address, used the phraseology "the paramount aspects of university responsibility in the world of today and tomorrow." He added something about "the general field of science and technology." I applaud the fact that here in a celebration of seventy-five years of fine accomplishment by one of our great state universities, eyes are turned only fleetingly to the past and focused really on today and tomorrow, most of all on tomorrow. The word "responsibility" is indeed the proper one. Any attempt of mine, however, to define the university's present or future responsibilities is limited (or on second thought, perhaps the reverse) by the fact that I am not a professional educator—university or any other kind.

Our educational processes in my opinion are inadequate. They cannot wisely be considered adequate to guarantee survival in the kind of world that has evolved. This is true if we think of survival in the relatively narrow, though hardly unimportant, sense of being sure that we do not lose a war if war comes. It is true if we think of survival, as we should, in the broadest possible sense—preservation of the great values of our kind of life, the values that constitute the Liberal Idea.

It is also true, I believe firmly, that our over-all educational processes serve and help the people as a whole more widely than those of any other nation—any large nation, at any rate. But that is no answer to the question as to whether they are good enough. There cannot even be a rational question as to whether they are as good as they could be made. Although I make such a statement about education as an admitted dilettante in that field, I have in years past emphasized repeatedly the need for improvement in my own profession or trade, that of the press. I believe that improvement is needed in all our agencies of education. The conditions and problems that we shall be steadily facing are such as to make more adequate education far and away the central concern of all of us.

I speak as a citizen who has that concern and that conviction, as a

citizen who has happened for a little while to share the responsibility, as a public official, for the most portentous new development of our times. That experience has greatly reinforced my conviction; for the many difficult problems which this new development raises, while wearing the aspect of uniqueness, are essentially like our other major problems in that they are dilemmatic, in that they are at bottom problems of education. They go clear across the board, affecting us ultimately in practically all aspects of our lives. And they bring a new urgency as to time, as to the rate at which we must make progress educationally.

We do our educating with a three-pronged system, or a two-pronged system plus a "benign chaos" operation. First, of course, is the public school system with its supplement of a few private schools. Second is the college and university system. As President Stearns has emphasized, this level of education is enriched by the state university system plus privately endowed universities. In addition to these bases of our whole educational system—the public school system, the colleges and universities—there is a complex that properly falls under the heading, adult education. These systems or levels are all inter-related but in some important respects are not related closely enough. There is great need, for example, of a more vital relationship between the universities and adult education. Indeed, at the present time, among the most effective of our agencies for adult education are our economic pressure groups. There are lessons to be learned from their methods, but there are obvious limitations in the results that they can achieve. There are equally obvious and greater needs for an education which goes above and beyond the pressure groups and points authentically to the general interest.

I have a layman's awareness of certain difficult and important problems of the universities and colleges, such as the one which Karl T. Compton is, I believe, currently and wisely spotlighting—the dual responsibility of carrying as much as possible of education to as large a number as possible and of simultaneously providing stimulus and opportunity for the exceptionally equipped. I have the same limited layman's understanding of the meaning of the "Great Books" debate. There are, of course, other problems. Their importance in clarifying both educational objectives and educational approaches is obvious.

But it is inevitable that I should come to objectives very broadly and to methods very diffidently if at all. Perhaps naïvely, I believe that answers even to the toughest and most important questions like those I have glanced at can best be got, can indeed only be got, through reference to a frame of grand objectives within which they all belong. I can only try to perceive such a frame through the needs and urgencies that my own set of anxious responsibilities has driven in upon me.

As to universities, they produce graduates, including specialists of many kinds. They teach and train. They are users and distributors of the acquired knowledge of the race. They are centers of research for advance to more knowledge and for better understanding of its implications. They are incubators of ideas, theses, scholarly books which carry education slowly through the whole of our society. Their real functions in a free country are complex, numerous, and broad. Above all they are a *part*—vital but just a part—of the total educational process on which everything depends. The real measure of their contribution is in terms of that total process.

Our deepest problems, our toughest dilemmas, are the kind that put requirements upon the whole of our education. They are not soluble by any part of it alone, not by the universities alone. But the role of the universities in solving them is critical, strategic. The universities largely determine what our education shall be like, how effective, how nearly adequate. In the end, education at the lower levels is in a considerable degree what higher education makes it; the ways it does this, direct and indirect, are numerous. Probably the converse also is true. If there are today grave and urgent needs running deep through all our education, the universities and university people surely must see them, face them, lead in meeting them, and help to swing the whole of our education toward the essential contributions.

I HAVE acquired my notion of what these deepest needs are, as I have said, through my experience of two years in the strangest business on earth—the mushroom cloud business. In the first place, this business is an epochal break-through into a new world of knowledge—only a break-through, only a beginning. It is a great and complex going concern as an industry. I use “industry” in the broad sense for an

industry that is all about us, although as a people we are almost entirely unconscious of it. It is as if there were a second and invisible America grown-up and threaded through the rest of our America. And that is certainly true of the state of Ohio. This new development is also of vital military significance. It is also an adventurous and potentially dangerous experiment in government. It is scientific research, development, and application on a prodigious scale, with the pressures of a troubled world situation behind it. Atomic energy is indeed a challenge to education; it is dependent for its future, good or bad, upon education.

I could very easily center my attention on specific educational needs. I could repeat, for it would be repetition, that the greatest bottleneck affecting rapid progress is lack of scientists and engineers, that more fine ones must be trained, and that the universities must train them. That would be accurate. Consider it said with just one addition as a reminder, that the universities alone cannot do it. Even to meet this quite specific need, education at the high-school level must do its part, for the universities train in science and engineering only those who come up to them.

I could proceed by pointing to the new careers and the new subdivisions of old careers that the break-through of knowledge has opened up already and will continue to open up. Some months ago I tried to make up a list of new careers and significant modifications and alterations of old ones. The list, although incomplete, of course, was long. In time these changes will affect many university departments and need to be studied by practically all of them; I would not exclude even the theological school.

But, though I added a dozen other specific and truly important needs of the nation that are special calls on the universities, I could easily miss completely my real concern. I have gone through a two-year process of being educated, of perceiving and worrying about a great many specific problems and needs, and of finding gradually and inexorably my real anxiety centering on needs far more general and fundamental than any or all of the acute specific ones.

Let me pull out for illustration one or two only of the problems that are central and pervasive in our whole atomic-energy development.

I say "for illustration" because I could pull out many another for the same purpose and because it is not the number and complexity of problems but their nature that I want to expose. Bear in mind that this strange problem of ours is like a buried mastodon with a great many tails, the tips of them just above the sod. Mowing off tail tips is useless. Take hold of any of them and really pull, and the earth begins to move and the gigantic shape to reveal itself.

FOR the first of my illustrations, we must start at the base of our firm national policy. Recognizing that the potentials of atomic energy both for war and peace are vast and that the two sets of potentials are closely intertwined in exploitation of the new field of knowledge, we want supra-national control of the dangerous phases but, as long as this is lacking, we must put national security first. Such is our policy.

But how does one do that? What constitutes national security in terms of atomic-energy development? Possible answers boil down to the alternative, posed originally by the scientists: "Security through secrecy or security through achievement?" In the last few years the most grotesque misconception, which envisaged a single master secret monopolized by us, has been almost destroyed (I hope it has been), but the question is still with us, just as tough as ever. For every misconception that is destroyed, two new ones seem to arise. Where to find the balance between reliance on secrecy and reliance on getting ahead is a continuing question, and it is one that is answerable not in terms of agreement in principle but only in terms of specific decisions.

Now it is not extremely difficult to get agreement in principle today among intelligent men—scientists, engineers, industrialists, public administrators, military men, those in politics who are informed, and our diplomats—that, for anything but the shortest run, the main reliance must be on progress. Yet it is altogether possible, despite this bending to resistless logic, for the reality to be a greater and greater reliance month by month on precisely the opposite practice.

The reasons for this danger, and indeed I think it is a danger, are various. One is the tendency for secrecy in government to creep, to cover always more and more; "security" is a wonderful cloak. Another is the simplicity of the security-through-secrecy idea; it is so easy

to grasp, it is so tempting as a retreat from complexity. Another of the reasons is the fear psychosis—which does not suffer from lack of stimulation—to which timid public servants can react by always “playing it safe” at the moment and in the specific case, though that policy be for the long pull “playing it reckless” from the standpoint of the national interest. This is a danger of which we on the Commission are acutely conscious. Underlying all these reasons and others, there is the want of public education as to the nature of this problem.

Think also how this question of security through secrecy ramifies when closely inspected. Remember that this nation has never before had experience with a situation in which the temptation is to identify security with secrecy. Remember that only the totalitarian nations have really had such experience. The fact that it has not been a very successful experience may be irrelevant or may not be. Bear in mind that Nazi reliance on secrecy, behind which they developed for blitz war the skillful combination of aviation and armor, and the Japanese reliance on secrecy, behind which they built better airplanes and better torpedoes and two 65,000-ton battleships with eighteen-inch guns, were not comparable with what major American reliance on secrecy in atomic energy could become.

For in this field we have not something like a new and better 90-mm gun. We have the break-through into a new world of scientific knowledge. The exploitation already spreads through major segments of our national life, including the industrial and academic. Our universities are deeply involved. The whole course and trend of science, of basic national attitudes toward science is involved. We as a people could too easily come to regard all progress in the nuclear sciences from now on as presumably “classified” (meaning necessarily secret) and subject only to bit-by-bit declassification through unworkable processes.

Bear in mind that if the nation in effect comes to rely for its security on secrecy rather than on progress even though heads may nod all over the place in agreement that the opposite ought to be true, this reliance has its implications. It means that fewer and fewer will know enough to participate in progress. Given time, I could outline field after field in which scientific progress is dependent on information, from basic research in nuclear physics to the processing of low-

grade ores for uranium, and in which the price that would have to be paid for security through secrecy would be stupendous.

Now let me spell out just one example, the last one that I have suggested. I have deliberately chosen that one because it is remotest in the process stream from weapons and also because, while apparently remote from the university field, it is not actually so at all. I mentioned the processing of low-grade ores for uranium. Now the secrecy basis of security is jeopardized every time you let one more man know the "facts of life" about even one phase. This is mathematics, not patriotism or morals. Yet there is no way of progressing in developing new technical processes for a new kind of job except by getting more brains to work at it—in this case largely the brains involved in present industrial operations in various mineral fields. The fact that a problem even exists here indicates how pervasive and spreading the reliance on secrecy tends to become. It illustrates how in the name of security secrecy can cripple security. And, since the brains and resources of many university laboratories can clearly help the industrial staffs, it illustrates again that wherever we take hold of this concern for the national security, we can find at least one vital cord leading into the universities—and, if we look more intently, usually quite a few cords, some of them the size of hawsers.

I have been dealing with the secrecy-through-security idea so far in terms of easily measurable results. But the implications do not stop there. To indicate their extent I merely ask: What becomes of the principle and reality of democracy if the people as a whole know nothing as to where they stand security-wise, as to what is being planned and done and why, and even as to what it is that they must themselves be prepared to meet and deal with? Questions like this are with me and my colleagues all the time, and always in relation to the solemn injunction of the Atomic Energy Act that consideration of the national defense and security *must* today be paramount.

All this and more is involved in the one illustrative question raised by atomic energy in the world as it is—a question that is so commonly looked upon as simple and obvious, with a simple answer in black and white. I pulled on the tip of just one of the tails of the buried mastodon, and see what has appeared. I could have pulled at many others.

CONSIDER now another part of the picture closely related to the illustration I have discussed—really a part of it—and also forced upon us by the state of the world: the dependability of people. This problem is much broader than its bearing upon the broad atomic-energy field, but I shall stick to that aspect of dependability.

Fifth columnism with all its methods is a reality that we cannot dodge. As a result, everybody who works in atomic energy close enough to classified information to have presumable access to some of it, from scientists to laborers, must be investigated and “cleared.” In the case of organized laborers, even those at a distance who have disciplinary authority over workers must be investigated. During the war when atomic energy was a military mission (I am quoting from recent statements of General Groves) some six hundred thousand individuals were employed at one time or another. All of those persons may be assumed to have been investigated in one way or another. Records of one kind or another, including anything findable that looked derogatory, came into existence. Operating now under the Atomic Energy Act, we have some three-score thousand who are subject to very thorough background investigation. Naturally, there continues to be both an over-all increase and a turnover every year. The net result is that for the first time in our history we have in the files of government confidential dossiers about a significant number of people, a number that grows daily. The personal histories on file have to do, not with loyalty alone, but also with character and associations; that is what the law says, and the interpretation can be as broad as all outdoors.

Of course, the great majority of all investigations turn up for the records nothing troublesome as to loyalty or even associations and character. We should not get exaggerated impressions. My point merely is that this process, at least as to scale, is new in our experience. I can see no possible alternative. It has to be. But it is not without possible dangers.

There are those, including men sincere and able and deeply patriotic, who seem to favor applying a sort of “Caesar’s wife” principle to this problem. Their view seems to run like this: Nobody against whom anybody else can cast a suspicion should be allowed within gunshot of atomic-energy work. If such suspicion arise after a man is in

such work, then, even at the risk of injustice to a considerable number of citizens, the nation's interest must come first. This requires instant decapitation—off with his head, firing and blackening without procedures designed to assure as much fairness as possible.

Now we who bear the responsibility in atomic-energy affairs have rejected this extreme view. We have set up procedures aimed to be fair, as well as to give real protection against the harm that could be done by the subversive or the unstable. It may well be true that some injustice is inevitable, men being fallible, including even us. No one should be happy about that. Injustice is hardly compatible with "the American way." Since accomplishing anything is dependent on people, the wanted result of greater security would hardly be got by the drastic policy that some advocate. It runs in my mind that John L. Lewis has said some things recently about Mr. Truman that could raise doubt, if taken seriously, as to the suitability of Mr. Truman for access to restricted data. If one does not take such remarks seriously, it is still unfortunately true that not many people are of such sort throughout their lives that no other fallible human being conceivably could put into a secret record a nasty accusation against them.

Not as a scare, for I do not think the worst is going to happen, but as a warning of what has happened again and again in human experience, I suggest that the possible implications of this whole difficult dilemma be thought about by the American people, and perhaps especially by educators. Can we really make ourselves stronger by junking our concern for justice, even if we junk it sadly? We have never had to face on such a national scale such a problem before. It looks as if we shall have to face it now for quite some years to come. They can be perilous years in which survival may need to be thought of in terms of "survival of what?" I am confident that the American people can handle that issue, dilemmas being "their meat," if education in the broadest sense helps them see relationships.

NEEDLESS and boring as repetition may be, I repeat that it is the *nature* of the problems when pursued through their implications that I am aiming at solely. I could pick out not a score only, not a hundred only, but I honestly believe a thousand specific problems of

some interest to you as citizens and as university educators. It takes restraint not to bring up more of them. I shall deal with just one more, again with emphasis on the nature of the problem, again with an effort to suggest its implications, again with the conviction that digging out implications is the most important concern of all. And it occurs to me that if the statement that the digging out of implications is the most important concern of all be true, then the statement itself has implications for education and the universities.

My one additional illustration is the problem of science in relation to strength, in relation to values, in relation to survival, and therefore in relation to education.

Our dependence on science and technology both for military defense and for economic welfare is obvious. It must be remembered that on the military side this dependence goes far beyond atomic energy, crucial though that development is to our safety. Not so obvious, however, is our dependence upon co-operation between the natural and the social sciences in the kind of world which has evolved as a result of the break-through into the nucleus of the atom—a relationship particularly emphasized by Mr. Stearns in his address at one of these meetings. Because of that break-through, the natural scientist is forced to join with the social scientist as a participant in public affairs. This assumption of “public” responsibility is, I believe, permanent, irreversible, and essential, though I have been able to understand the reserve of some natural scientists and though I did not have two years ago the conviction that I have just expressed. That there are some risks in this to scientists and science is doubtless true; yet the situation cannot from now on be otherwise. The atom bomb is not the last result of research in natural science that will have social implications which the natural scientist himself will have to think about and with which he must be socially helpful. In so far as there is a gulf between the natural scientist and the social scientist, that gulf needs bridging—and the bridging must be a constant process, particularly in the universities, not a broken process taken up as an emergency every ten years.

Since we do depend vitally on science and technology, we depend on scientists and technicians, and I mean to include engineers. Of course we need more. And here, I submit, is a rather far-reaching

educational implication of that need. If any considerable areas or strata in our country lack equality of educational opportunity from grade school to university, then we shall be foregoing the use in the future of the scientific and technical potential within that part of our population. For sheer military defense, not to mention other considerations, serious inequality of educational opportunity affecting any considerable part of our young population is something we can no longer afford. Perhaps, if that fact becomes well understood we shall get the money needed to provide equal educational opportunity.

I have just one other thing to say about science in general, for I am only "hitting the high spots" or, rather, the deep spots, as I have come to perceive them through my own recent postgraduate experience. I have already mentioned the danger of stifling essential progress by drifting—partly through current fear and partly through inheritance from the last war—into the notion that *all* natural science, or at least all nuclear science, must be presumed to be "classified" save as bits of knowledge from time to time may be found safe for declassification. We should be sunk if that came about.

There is also the danger that, because of wartime experience and inadequate past education, the very nature of scientific research in the frame of the American philosophy may not be understood either by the public or by national policy makers. The notion that only such research is important as is directed to immediately needed, specific ends, and therefore only that is deserving of support, is an easy one to fall into. This notion is a natural reaction, I think, of the ill-informed to an experience which suggests that given billions and priorities any specific goal can be reached. Such an attitude is dangerous because it would choke the spring that fills the reservoirs of basic scientific knowledge, from which all streams of "practical application" flow.

As we reflect upon this danger, we also should reflect that the further we drift from the concept of scientific research as essentially the pursuit of knowledge and the more we are tempted to accept the view that research makes no sense unless directed to meet urgent perceivable needs, the more we have nuzzled up to a whiskered gentleman named Marx. We could easily, with respect to science, swallow the whole pill of Marxian doctrine, tasting only the sugar and peppermint. For of course the recent news about orders from the

Politburo to Soviet scientists to stick to the party line of Lamarckian genetics was no news to the broadly informed scientist and educator. It was merely an instance, made popularly newsworthy by the time, of the dogma of economic determinism for everything—science, art, even religion. It might be quite useful if all our public leaders, policy-making public leaders included, were helped to see this. I am tempted to be indiscreet and add money appropriators too.

Admittedly it is a little difficult to fit the discovery of nuclear fission into the category of an obvious response to the urgent needs of this generation. And I suggest the possibility, as my colleague Robert Bacher, an authentic scientist, once suggested it to me, that adherence to our own concept of the importance of untrammelled basic scientific research could be our most potent “secret weapon”—secret, of course, only from those so blinded by dogma that they refuse to see.

GETTING into the nucleus of the atom and doing things with some of its pieces is indeed likely, as our federal law says, to “cause profound changes in our present way of life.” It is indeed true that its effect “upon the social, economic and political structures of today cannot now be determined.” But the essential nature of the problems is not undiscernible. Not altogether. Since this advance in knowledge of nature was not really a bolt from the blue but rather the latest product of a long process of scientific research and technical application, it is not surprising that the problems which it makes more inescapable, more urgent, more critical from the standpoint of the survival of our values, are problems recognized before.

They are indeed more urgent, for they are at bottom educational problems. And the truly relevant education, as I see it, can be subsumed under three categories: first, education about democracy—the wide recapturing of a fuller understanding of the meaning behind shibboleths, of the values that we must preserve, of the reasons why they are values, and of ways and means to apply them in the world of today; second, education about science—factual education to bring the things that we must now live with into the orbit of understanding, of familiarity, of non-magic and non-hysteria, but, in addition to factual education, education as to the nature and method of science, the type of training James B. Conant has stressed; and third, education about

education—a more clear-cut and less fuzzy appreciation of our vital dependence on education (we know we are dependent but why and how far?) and an increased understanding of the fact that education to *serve* freedom must *have* freedom.

The importance of education for democracy was emphasized recently by a distinguished recruit to the corps of professional educators, Dwight D. Eisenhower. He stressed “love of freedom, confidence in the efficacy of co-operative effort, optimism for the future, [and] invincible conviction that the American way of life yields the greatest human values.” He suggested that the way to gain such ends is “to help the student build these attitudes not out of indoctrination, but out of genuine understanding.”

The ultimate test of the adequacy of education is the degree of success attained in making people want to understand and capable of understanding relationships. The real goal of teaching and training and acquiring more knowledge requires that education be regarded as integral—the opposite of more and more compartmentalization to produce more and more specialized competencies. If I am saying in other words what Robert L. Stearns said a moment ago, fine. I have come to the same conclusion through another approach. Integral education means to me that mathematics, for example, is not well pursued unless its function as a tool and key is emphasized continuously from the start; that history is not well studied unless it is realistically related to the present; that the natural sciences are not mastered without consideration of their implications for man; and so on through the varied subjects. In the end, the proper study of mankind really is man—man, his aspirations, his works, and his problems. Higher education must mean both altitude and horizon.

I do not consider that what I have said is opposed to specialization. I consider it to be specialization plus—the plus being deliberately exalted as the integrator without which we have only strength without purpose, which is in the end not strength at all.

FINALLY, since I speak from a standpoint of strange and new concerns (which I insist are related to the deepest of our concerns) and since I speak at a particular university whose jubilee we celebrate and whose forward look we applaud, I dare to suggest one particular

opportunity that may be related to the words of President Bevis with which I started.

The Ohio State University is one of thirty major educational institutions in the Argonne National Laboratory group. The Argonne National Laboratory—an atomic-energy laboratory—has a dual mission which is very important to the nation. Its specific mission is largely secret research and development of nuclear reactors. Its much broader purpose of mobilizing the universities behind it is not only to strengthen the laboratory for its work but also to strengthen the universities for theirs. The values, short-run and long-run, to our national strength are obvious—and I mean national strength for whatever purposes, especially for peaceful ones. There are great potentials in the very fact that the educational institutions of the Argonne group *are* educational institutions.

One hears much about various kinds of “know-how” important to our strength and survival. There is educational “know-how” too, whose application is essential all along the line, all across the front; and, for anything beyond the shortest pull, more basic and important than any other type of knowledge. May there not wisely be vigorous exploration of the ways in which the thirty universities, profiting by their association, may put all of that educational know-how to use to create the foundations of understanding that are the foundations of American strength, which in turn is a foundation of effective American moral purpose in the world?

THE THIRD CONFERENCE

Chairman:

GORDON KEITH CHALMERS, President, Kenyon College

Speakers:

MILDRED McAFEE HORTON, President, Wellesley College

REINHOLD NIEBUHR, Professor of Applied Christianity, Union
Theological Seminary

OPENING REMARKS

By GORDON KEITH CHALMERS

I HAVE the welcome duty at this session of the seventy-fifth anniversary celebration to bring to The Ohio State University the greetings of the Association of American Colleges, of which this university is a member, and to add the greetings of your neighbor, Kenyon College.

This session of the program is devoted, as you see by the titles of the addresses, to the general subject of religion and human affairs. We are to hear two addresses, the first by one who is unquestionably a leader in educational thought and practice in this decade—Mildred McAfee Horton, President of Wellesley College. During the war, as director of the WAVES, she was awarded the distinguished service medal, and the rank of Captain by the Navy. Mrs. Horton was one of the American representatives sent by the State Department to the Far East to advise the occupation government concerning the reconstruction of education in Japan. She is a member of numerous guiding groups concerned with American education, notably American higher education. In many ways, by example in her own institution and by emphasis in educational discussion, she has accomplished an important task in this middle part of the century. This is a time when the measurement of externals has engaged the attention and the talents of the talented. When the measurement of externals has displaced the judgment of value, Mrs. Horton has been one of those who helped to focus attention upon the inward meaning of what is taught and of what is sought in inquiry. She will speak to us on the subject "Living with our Human Relations."

The second speaker of this afternoon's meeting is Reinhold Niebuhr, Professor of Applied Christianity at the Union Theological Seminary. He has for many years, by action as well as by precept, been engaged in the defense and the exposition of genuine liberalism. He and some of his discerning and courageous colleagues have been responsible for rescuing from Fascist oppression some of the strongest and most fruitful liberals of our time. Like President Horton, he also

has been engaged in a mission for our State Department. He has been in Germany, working with the re-establishment and reconstruction of higher education in the occupied territory. One might introduce Professor Niebuhr in any one of several guises. One might take the phrase from one of his early books and introduce him as a tamed cynic. One might recognize him as a member of that bright succession, particularly numerous in the seventeenth century and regrettably few in the twentieth, of discerning minds who love a paradox. One might introduce him as a member of that distinguished succession of Americans who have delivered the Gifford Lectures—the list includes William James and Josiah Royce. His own Gifford Lectures published in two volumes, *The Nature and Destiny of Man*, and another of his works, *Moral Man and Immoral Society*, unquestionably place him among the significant theological and humane thinkers of our time. Many have disagreed with him; some in anger. All, I believe, who read him with care and who are qualified to deal with the questions with which he deals are prepared to say, whether they agree with his conclusions or not, that he has undoubtedly asked the right questions for our period. To say that is to say that he conforms to Socrates' definition of the wise man—he who asks the right questions of nature. Professor Niebuhr undoubtedly has been asking the right questions of experience as we see it; and his voice is one of the few which speak to the age. His subject this afternoon will be "Our Pilgrimage from a Century of Hope to a Century of Perplexity."

LIVING WITH OUR HUMAN RELATIONS

By MILDRED McAFEE HORTON

I WISH to take just one moment of your time to bring greetings to this great University from Wellesley College, which has paid you the perfect tribute of imitation. We waited for two years after The Ohio State University was started to see if it was a good idea to have higher education; then Wellesley was founded.

The only thing harder than living with our human relations is living without them. The solitary man or woman is not fully human, but we do not need to worry much about that because it is practically impossible for anybody to survive in a truly solitary state. Human relations are inevitable facts of human experience, and it seems strange that out of our necessity we should have invented so little to make them an asset rather than a liability.

It is worth taking a minute to ponder why human relations in the modern world are so problematic. Why is it so difficult for people to get along with each other when they clearly cannot get along without each other?

My too simple answer to that pretty profound question is that fundamentally "all men are brothers" and are sufficiently alike to expect more unanimity than they actually have. There is a family resemblance among men of all cultures, and we are prone to expect from them action which is both comprehensible and similar to our own. When we do not find our purposes served by men who ought to know better, we resent them and seek to "put them in their place," which really means to keep them out of our way.

At the risk of straining a figure of speech, I want to emphasize the fact that it is the actual *brotherhood* of man, the realistic family resemblance, which makes it so difficult to exhibit the kind of brotherly human relations which most of us in this room would recommend as appropriate in an enlightened age.

If we did not belong in the same human family, it would seem to be relatively easy to work out a formula for getting along on different planes of human experience, mutually irresponsible. We are increas-

ingly aware of the fact that we cannot—even if we want to—ignore the bond which ties us all up in one all-embracing human relationship.

I have referred to that relationship as brotherhood, and by that term I indicate my starting point and my initial prejudice. I proceed with my argument from the premise that the relationship between men is a personalized one, that we are not automata nor units in a depersonalized cosmic process.

During this past summer I had the unusual opportunity of attending the first Assembly of the World Council of Churches. On one occasion at that assembly I heard a moving address by Bishop Berggrav of Norway which began with a statement of this assumption of the personalized relationships, that I should like to quote. I do not expect all of you to agree with his position, but you will need to understand it before you can follow me the rest of the way.

The cornerstone document of humanity from 1776 speaks about the Rights of man, *endowed upon him by his Creator*. Quite differently reads article I in the lately proposed Declaration of the United Nations 1948:

“All men are born free and equal in dignity and rights. They are endowed *by nature* with reason and conscience and should act towards one another like brothers.”

“Endowed by the Creator” here has been supplanted by “endowed by nature.” The Creator is dropped, Nature enthroned. There you have the difference. You may test the reach of it, if you compare the appeal included in calling upon a man or a nation, saying: “You are responsible towards your Creator” with “You are responsible towards your nature—or towards Nature.” When God is left out, nature becomes master. . . . If the only stronghold of human rights is that they have been endowed upon us by nature, then the human rights are delivered at the mercy of certain human instincts, and of those exploiting them. These instincts and their exploiters will ravage societies and nations. As the only possible liberation from these forces, the Christian witness sounds: There is a living God! Your responsibility is towards your Creator!

The problem of human relations is not that men “should act towards one another like brothers.” It is that men cannot help being brothers, and injury to another human being is injury to one’s own. That is why injustice and the violation of human rights are so bitter

and so debilitating to a society, to any society in any economic system. They are perversions, abnormalities, blights on the health of the body politic.

SINCE human beings have so much in common it is peculiarly difficult to sympathize with their differences. A Dutch child tried to talk to me this summer. It was positively disheartening to watch the growing disillusionment as the youngster gradually realized that this creature who looked like a human being was so unutterably stupid that communication was impossible in human, namely Dutch, language.

Some years ago I made my first visit to Japan. During my stay of sixteen days I gave excellent advice on how to democratize Japanese education. The effectiveness of the advice is certainly to be questioned but not the educational value of the visit for me. One of the very enlightening experiences was to learn from a Japanese statesman that Japanese men held their wives in such respect that they left the entire household management to them and thus occupied them in such important matters that they did not have time to gad around like American women. Imagine my personal embarrassment at that moment. It was even more enlightening because it was more surprising to me, to learn from a French woman this summer that continental women hoped that international organizations would not exert such influence in France that the backward social position of women in America would be imposed on them. She explained that French women do not have to have things like women's clubs, women's organizations—she might have added women's colleges—because they exert influence directly on public and private affairs. They might not hold office (though she thought they held a good many more than American women do) but they knew they exerted direct influence on any man who held any office, and they prefer it that way.

In one section meeting at the World Council of Churches, a memorandum was under discussion which called for a statement by the delegates to the effect that they believed in defending human rights and demanding them for all men everywhere. A delegate from Czechoslovakia who had been trying to explain what he called the "Eastern point of view" said that such a statement would surely have the

approval of thoughtful people on either side of the iron curtain, but that it would not mean in the East what it means in the West. In the East it would mean the right to have food and shelter—economic justice. In the West it would mean the right of freedom in general. Saying that all men should have their inalienable human rights meant nothing until it was agreed what those rights are and the order of their importance. All of which sounds like the mutually exclusive definitions of democracy which are so irritating because they use the same terms with diametrically different meanings.

Human beings who act alike and then put radically different meanings to their actions are confusing to each other. If American men keep women at home, sit at table with their guests, and allow their wives to appear only as waitresses bringing food from the stove, it does not mean what my Japanese friend said it meant in Japan. Women's club activity does not mean in America what my French informant thinks it means. Until you know what the other person means by his action you have to assume he means what you would mean if you did what he is doing. When you treat him as he should be treated if he were doing what you think he is doing, he is perplexed or infuriated; then you are perplexed or infuriated and human relations are definitely strained.

IN ORDER to complicate things further we are so bound in this family relationship that we seem to assume that the more closely people resemble each other in some traits, the more intimately related they are and the more they can be assumed to be similar in all ways. How else can we rationalize the categories into which we put people: women, Jews, Negroes, foreigners, Catholics, Protestants, Russians, university graduates, and so on? Statistically any recognizable group can be treated as a unit and can be described in a category. It is a convenient device, useful in conducting Gallup polls, practically helpful in many ways. It is logically indefensible, however, to assume that any one unit of the sample is typical of all the rest unless the sample has been made up originally of identical units. I am not sure I am stating that to the satisfaction of my statistician friends, but I think you all know what I mean.

I personally get very much bored with the idea that having one woman on the board of directors of an organization means that all women are thereby represented. The importance of the election this summer of Margaret Chase Smith to the Senate is not that at last women will be given a fair deal by having a Republican spokesman on the spot to represent them in the Senate. The election is significant as demonstrating that the state of Maine knows a good senator when it sees one and is not prevented from sending that senator to Washington because the senator happens to be a woman.

The reasons, it seems to me, for requiring that minority groups be directly represented in civic and other affairs are (1) that we need to learn that minority groups are *not* made up of uniform units and (2) that individual members of these groups who have contributions to make to the common purposes of both majorities and minorities can all too easily be overlooked unless their contributions are specifically sought. Having a representative of a minority group will soon show you that the person has a mind of his or her own and does not represent the thinking of a great composite group. When human relations are what they ought to be, I think that no group will have to insist that one of its members must be "on the inside" in order to have the group interests safeguarded. But until then it is a good idea to be sure that minority groups are consciously represented when matters concerning them are under discussion.

If we would improve human relations, then, we must first come to know each other better—and thus understand the meaning of the actions of people superficially like but culturally unlike ourselves—and, in the second place, we must learn to avoid judging individual members of statistical groups as identical with all the other members of their category. Some little girls are nice and some are horrid. So are their parents. Some Republicans are smart and some are not. So are Democrats. Dare I say, so are Progressives and Communists and vegetarians and Socialists and all the rest?

FACED with the confusions of human relations between individuals, we find it easy to forget how human relations are complicated further by the institutions which men build to deal with them. All

over the world, in all cultures, men get together to accomplish common purposes. The organizations that they construct as means to those ends normally include some which develop into established institutions which become for at least some of their adherents vital means to the end. We have a state to perform governmental functions. We have churches as agencies for expressing our religious interests. We have schools for obvious purposes. We, the people, direct them all, but presently we discover that they begin to encroach on each other.

Then we find ourselves in the curious condition of building iron or other kinds of hard and fast curtains between institutions even when the same people belong to the same institutions and use them to solve identical problems. Take church and state, for instance. Each institution is responsible for the children of a community and, however separate the church and state, the child they each claim is not divided into separate selves, one for the church and one for the school, or if he is, he is no credit to either institution. Thus, however zealously we guard the idea of separation of church and state, we cannot avoid the fact that their fields of influence are not mutually exclusive. History has shown the fallacy of having political states dominated by ecclesiastical authorities. Recent years have certainly revealed the tragic results of the domination by an irreligious state of a subordinate church. But both institutions are concerned with the education of youth.

In our zeal to avoid encroachments by one agency on the rights of another, we run the risk of assuming in this country that the church must accept no responsibility for citizenship and that the state must renounce any responsibility for assuring children a chance to live in terms of religious beliefs. If we reach this conclusion we divorce each institution from life as it is actually lived.

Many of us have been interested in the Supreme Court decision declaring it unconstitutional for the School Board of Champaign, Illinois, to conduct its so-called "released-time" program for religious education. The Court has been explicit in saying that its ruling in the Champaign case has not determined the validity of released-time programs in general. It has certainly made it likely, however, that no program can be freed from the suspicion of unconstitutionality if it involves using school buildings during customary school hours for

classes in religion at which attendance is reported by a visiting teacher to the child's regular school teacher.

But even where they have seemed to be clearly within the law, released-time projects have been criticized on the score that dividing a school into religious groupings for the purpose of religious education creates divisiveness in the school. Children now discover which are Catholics, Protestants, Jews, and, so the argument goes, the knowledge prevents their accepting each other as fellow citizens. If this is true it is a terrible fact in a country dedicated to freedom. If a child is not free to be different from a dominant group without being the victim of ridicule, intolerance, or persecution, where are our vaunted liberties?

Mrs. Eugene Myer, for whom I have vast respect, speaking last winter before the Annual Convention of the Texas State Teachers Association, argued against the released-time program for a variety of reasons. She has been quoted as saying: "Lining up of the different denominations makes for divisiveness. In one school when the Catholic children were leaving, others shouted: 'There go those Micks!' A nice democratic atmosphere!"¹

Well, it is clearly not a nice democratic atmosphere, but I wonder if that episode does not present an important opportunity for education in understanding. If children treat representatives of other faiths derisively, I wonder if the school is not a pretty good place to bring that fact out into the open where it can be dealt with educatively. School would seem to be a good place to learn to recognize religious differences as facts. An American who taunted a foreigner in school would presumably be taught then and there that such action is unworthy of an American. Ridiculing children for different faiths is un-American. Occurring in situations divorced from the school, it might pass unchallenged. It should never pass unchallenged in the school. Teaching children to respect each other's differences cannot be taught best by concealing the fact that there are differences among them.

American public schools are parts of a national culture which includes a recognition of the existence of God. After all, the most secular of economic units, our coins, carry the slogan, "In God we trust"—even during inflation. Without infringing on freedom of con-

¹ Meyer, Agnes E. "Shall the Churches Invade the Schools?" *Reader's Digest*, LII (March, 1948), p. 67.

science and without involving commitment to any theological or ecclesiastical doctrines, dinner guests, legislators, delegates to varieties of assembly are led in simple prayer. That is a custom in the secular realm which is a recognition of the religious tradition which differentiates this country from certain others. To require religious practices of any sort in a public school seems to me unwise. To permit them under the auspices of the school itself in communities which want them seems to me reasonable in a land with our particular heritage.

However, where schools could help to make students aware of the vital significance of spiritual values, one wishes they could be free to do so without seeming to encroach on church territory or be themselves threatened by encroachment. There are too many demands on man's energy these days to waste it on jurisdictional disputes among agencies which share common purposes.

That the schools are not encouraged to help in this area is evident in too many communities. Why? The basic reason is that religious men and women are fearful of each other and of sectarianism, almost more than they fear secularization of an erstwhile spiritually sensitive society; secularists are fearful of religion and its power to alter lives and society.

Bigotry and proselytism explain that sensitivity and will act as irritants as long as they are allowed to exist. It is these characteristics of religionists and secularists which make it difficult to use the schools fully and adequately as instruments together with church and family for the introduction of children to the religious institutions of their communities. It is the task of the school and the church to educate our citizenry away from such attitudes.

AND what has all this to do with the seventy-fifth anniversary of a great university? Chiefly this: A university is one of the great institutions in American life which is equipped to contribute directly to the understanding of these complexities of human relations. If it be true that our basic common humanity is one of the reasons for the complications in our human relations, a university which helps us to understand that common human nature is contributing to a comprehension of our relationships which we now lack.

A university which brings to a common center representatives of

cultures from all parts of the world serves not only as a laboratory for the discovery of facts about human nature, but as a great demonstration of the possibility of good relations between people of different cultures. The meeting here of young people of a variety of nationalities, of different language groups, makes it possible for them to return to their home countries as emissaries of understanding. As they bring to America the opportunity to know individuals as persons rather than as queer strangers, these foreign students gathering in a great university contribute immeasurably to the possibility of good human relations.

At the meeting of the National Commission on Unesco in Boston last month, Archibald MacLeish made the telling observation that it is not the ideologies of the world which divide men. Rather it is the loss of the sense of human community. Surely a great university, attracting to its classrooms and laboratories men and women from around the world, is in a uniquely favored position to recreate for its students that sense of human community which this tired, mechanically dominated world so sorely needs.

Within these classrooms and on this campus a generation of students each year learns how to think its way through the totalitarian assumption of categories of people into an awareness of the individuality of members of social categories. We all know that some people go through their academic experience immune to the democratizing influence of a great opportunity and of acquaintance with people of types different from their own. It is true that some groups within any university emerge with snobbish attitudes toward other groups, but by and large they are not the representatives of the true university spirit. They are the men and women who have failed to profit by what the great university has to offer them.

In addition to what the university can teach its individual students about human relations, it serves in its institutional capacity as a great social factor in demonstrating the possibility of co-operation with other institutions in the improvement of the community of which it is a part. In the great struggle for academic freedom the state university is in a strategic position to demonstrate the academic responsibility of a place of learning. This university cannot live without co-operation with the state. When I think of the struggle that Wellesley is having to raise

seven and one-half million dollars and then hear what your legislature does for you, I realize the importance of your co-operation with your state. You make no effort to live without co-operation with the church. A great institution like this is bound close to the family of citizens of this great state. Thus higher education or the institutions which foster it are united with the other agencies of the community to work together in a pattern of human relations which can set an example for other institutional relationships.

I want to close with a few lines which were written by the late president emeritus of the University of Kentucky, Frank McVey, who asked, What is a university?

What is a university?
A university is a place;
It is a spirit:
It is men of learning,
A collection of books,
Laboratories where work in science goes forward;
It is the source of the teaching
Of the beauties of literature and the arts;
It is the center where ambitious youth gathers to learn;
It protects the traditions,
Honors the new and tests its value;
It believes in truth,
Protests against error,
And leads men by reason
Rather than by force.²

² *A University Is a Place . . . a Spirit: Addresses and Articles by Frank Le Rond McVey, President, University of Kentucky, 1917-1940.* Collected and Arranged by Frances Jewell McVey. Lexington, Kentucky: University of Kentucky Press, 1944. p. 6.

OUR SPIRITUAL PILGRIMAGE FROM A CENTURY OF HOPE TO A CENTURY OF PERPLEXITY

By REINHOLD NIEBUHR

THE life span of this great university, whose seventy-fifth anniversary we are celebrating, encompasses as significant a period of human history as has ever unrolled in the sad and majestic drama of the human race. The date of its birth coincides almost exactly with the beginning of the last quarter century of what F. S. Marvin has rightly called *The Century of Hope*. It was the last period in the life of modern mankind which had no misgivings about our civilization and no qualms or doubts about the progress of man onward and upward forever. That last quarter century managed to gather together all the hopeful and encouraging aspects of the human situation which the eighteenth and nineteenth centuries had explicated and to express the mood of modernity in one grand hymn of triumph.

The general optimism of our culture was accentuated in America and more particularly in the Middle West because the final half of the nineteenth century, the Civil War having guaranteed the continued unity of our nation, witnessed a marvelous expansion of every aspect of American power and culture. We were accomplishing what no other nation had had the chance to accomplish, the creation of a vast continental economy and a political unity of peoples gathered from every part of the European world. We achieved a new meaning for democracy as the wide open spaces of our advancing frontier broke the power of the European caste system and established a system of social equality and free opportunity. We brought races, hitherto in conflict, into a new concord as European immigrants co-operated in building this mighty nation. We achieved a standard of physical well-being not known before as we began to exploit with a single-minded devotion, the remarkable natural resources of this continent by the development of techniques which the more static civilizations of Europe could not equal or understand.

The nineteenth century was the century of hope, and our nation was in a peculiar sense the bearer of that hope. The nineteenth century

as spiritual history came to an end not in 1900 but in 1914. That was the date when world history began to refute some of the interpretations of life and history in which the nineteenth century most fervently believed. Even then, the historic circumstances which gave the creeds of that century their power and plausibility persisted to such a degree in our own nation that the creeds were not seriously shattered here, even though European culture was basically affected by the tragic events which began in 1914. With us, all the characteristic presuppositions of the century of hope persisted until the second, rather than the first, World War. We now have the task of reorienting our culture while we are in the throes of preserving a democratic civilization which is involved in a deep crisis and exposed to terrible perils.

It would be impossible to review the whole course of the spiritual pilgrimage from a century of hope to a century of perplexity. Let us confine ourselves, therefore, to those aspects which have an immediate and obvious effect upon the task of higher education; and more particularly to the so-called "spiritual" values which are implicit in our educational program. Let us survey some of the characteristic creeds of the nineteenth century, their refutation in contemporary history, and the task with which we are confronted by this refutation.

THE most basic of all nineteenth century beliefs was its confidence in history itself, its belief that historical development represented a progressive solution of the human predicament and offered emancipation from human ills. Everything in the history of culture in the past two hundred years served to give power and plausibility to the idea that there was nothing wrong with man which history (that is to say the historical growth of human power and freedom) would not cure. The historical sciences had proved irrefutably that human institutions, and possibly also human capacities, were subject to indeterminate growth. The natural sciences had added the discovery of the mutation of species in nature, thus proving that the world of nature, as well as human history, was subject to development in time. The advance of the natural sciences had meanwhile produced the by-product of modern techniques which led to the most remarkable conquest of nature by man. Natural resources were exploited for human ends, and natural

forces harnessed to human purposes. Human well-being and security were thereby tremendously improved. New means of communication and transportation annihilated space and time, and the growth of the medical sciences seemed to arrest the ravages of time in the human organism.

The achievement of modern culture was the discovery of an indubitable growth in man's freedom and power over nature, including to some degree a development of freedom and power over his own nature. The dubious conclusion drawn from this discovery (a conclusion which colored the whole of our culture) was the belief that this growth in human freedom and power was the guarantee of the redemption of man from the ills and evils which corrupt his life. Perhaps he was, or had been, ignorant but he was moving toward a higher intelligence; and the evils due to ignorance would thus be eliminated. Parochial tribalism and nationalism would gradually give way to universal loyalties. Superstitious fears would give way to the serenity of true knowledge. Perhaps man was or had been weak, but he was becoming strong. In time he would become strong enough to change his ambiguous position of both creature and creator of historical destiny to the position of the unambiguous master of his own historical faith.

It was this faith in historical progress which led to the equation of the word "progressive" with the word "good" and which seemed to invalidate every scheme of redemption imbedded in the classical and historical religions. The effect upon our institutions of higher learning was particularly marked because they were naturally in closer contact with the new streams of modern thought than was the culture in general. Thus it was possible for modern education to believe that the so-called spiritual problem of man was identical with his intellectual problem; and that the ultimate issues of human existence could be solved by an educational program which would help men to understand and to co-operate with this marvelous movement of humanity toward ever higher and more inclusive ends.

THERE was something wrong with this belief that history is redemptive. The experience of the twentieth century proved that there was an error in the estimates. Instead of the expected movement

toward a "parliament of mankind and the federation of the world," the world became involved in two successive global wars; and at the termination of the second the possibility of avoiding a third was uncertain. Instead of a movement toward universal democracy, a badly shattered democratic society had to face two successive forms of tyranny: the one informed by a morally cynical creed and the second one (which we are now facing) having distilled tyranny from the presuppositions of a utopian creed. Instead of a gradual movement from the use of the so-called "methods of force" to the so-called "methods of mind," our civilization moved inexorably from partial to total wars, total wars being those in which the entire community with all of its resources is harnessed to the martial task. This task incidentally availed itself of ever more lethal instruments of destruction. Where was the miscalculation which betrayed us to derive from an indubitable fact, the dubious and now refuted conclusion that historical development is redemptive? The miscalculation was this: It was assumed that the source of evil in human nature was solely in human finiteness, in the ignorance of the human mind, in the passions of the body, in the parochialism of yesterday. If this were really the source of evil in human nature, then the growth of human freedom would be tantamount to the growth in virtue. Increasing freedom over natural or primitive restraints would bring more inclusive and valid ends of human conduct.

The real fact is that the evils which corrupt man are due to corruptions of his freedom. They may therefore develop with the growth of freedom. A new power in human hands can be used for particular, rather than universal, ends. It is in fact used initially for such ends. Even when a new power is not in the hands of an obviously aggressive community this is the case. The power of atomic destruction is in the hands of our nation; and we find the greatest difficulty in making it the servant of a universal community rather than merely the servant of our own power. We hoped originally that the fear of atomic destruction would prove the propulsive power for the establishment of a universal community. But that hope proved vain. We discovered that the particular fears of men, the fears of what a particular nation may do to another particular nation are more potent than the abstract fear by universal man of universal destruction.

We are forced by our contemporary experience to make a rigorous adjustment in our previous beliefs about life and history. The truth embodied in the hopes of the nineteenth century is that human power and freedom do indeed develop. This development means that ancient problems are presented to us in ever new dimensions. The problem of creating a stable community with a tolerable justice is as ancient as the human race. The significance of historic development lies in the fact that we now face the problem in global terms. We have to solve the problem on the global level or perish.

The error which we must correct is the belief that the increase of human freedom and power *solves* any problem of human existence. Actually it makes old problems more complex. It does this because there is no virtue in freedom as such. The evils which men do are not merely the consequence of the inertia of nature. Race prejudice is not merely the vestigial remnant of barbarism. Race prejudice is the by-product of racial pride which may arise afresh on every level of group life. To think of ourselves more highly than we ought to think is a perpetual temptation to men on every level of culture and civilization. The primitive tribalist expresses a moderate form of such pride. A great America, dreaming of the possibility of creating an "American century," expresses another form of it.

Naturally we require constantly finer and more precise instruments of culture to deal with the problems of human togetherness on the new level on which we now stand. Every technique of psychology and every insight of the social sciences will be of value to us in understanding and coming to terms with our fellow men; but no form of knowledge guarantees virtue and no intellectual discipline alone determines whether a man or a nation will use his or its freedom to exercise dominion over others, to isolate self from others, or to come into a relation of mutual helpfulness with them.

IN CONSIDERING the modern miscalculation about the effects of the historical development of human freedom and power, we have already touched upon a second article in the creed of the nineteenth century which is implicit in the first article. It is the belief that the historical development of the power of reason, results inevitably in an increase of virtue. The faith in the growth of mind is, of course, only

one strand in the general evolutionary approach to life and history. The social Darwinists believed that the ethical progress of the human race was propelled by a struggle for survival. They regarded human history merely as an extension of the world of nature. But in general even the naturalistic philosophies have not accepted this thesis. They have thought of historical progress as due to the development of the power of reason. Moral evil, declares Leonard T. Hobhouse, "is the result of the pursuit of partial ends without regard to the effect upon others." The development of virtue is guaranteed by the growth of mind, both the mind in the human agents in the historical process and of a kind of world mind "operating under mechanical conditions, which it comes by degrees to master."¹ Sometimes it was assumed that it was the development of the rational faculty itself which assured the pursuit of the more inclusive rather than the partial and parochial end. In support of such a thesis it could be pointed out that the rational faculty is indeed subject to historical development. Children and primitive people have only an inchoate capacity for conceptual knowledge. The power of reason does grow; though it may be questioned whether it grows indeterminately, whether for instance any modern philosopher could claim to be endowed with a purer or profounder reason than Aristotle.

More frequently confidence was placed not so much in the growth of innate rational capacities as in the development of rational techniques for the management of human affairs, analogous to the development of scientific techniques for the conquest of nature. "Can we not," asked a typical exemplar of nineteenth century thought, "change the habits of men by the same intelligence with which we altered the face of nature?" "The methods of mind," declares a social scientist, "applied to nature resulted in civilization. But they have not yet been applied to civilization itself. When they are we will determine historical destiny as we have mastered natural process."

John Dewey believes that the only reason why we have not used these methods of mind in the realm of human affairs (in other words, why we have not achieved the attitude of disinterestedness which characterizes pure science) is that the struggle for the emancipation

¹ Hobhouse, Leonard T. *Development and Purpose*. Second Edition. London: Macmillan and Company, 1927. pp. 481-85.

of the sciences resulted in a compromise rather than in a clear-cut victory for science. In that compromise the natural sciences were given their freedom while the humanities remained under the restraints of traditional authorities, particularly church and state. All we need is one more movement of emancipation. All we need, according to other similar interpretations, is a little more time to give the social sciences a chance to mature.

Even when one recognizes, as does Julian Huxley in his *Man and the Modern World*, that there is a radical difference between the world of nature and the world of human nature and history, the radical difference is obscured almost as soon as it is revealed. The difference between the two realms according to Huxley is that man is himself involved in the historical process and is not merely a disinterested spectator. Exactly so. That is the "existential element" in the realm of history. We can never look at a problem in human relations in terms of pure rational disinterestedness because we are not pure minds. Our minds are organically related to ourselves as persons. As persons we love and fear one another. We compete with one another for power and for glory—and sometimes for bread. Huxley sees a little of this problem. We are inclined to "bias," he declares, in our social judgments as we are not inclined in the judgments of natural science. But, he goes on to suggest, this problem of bias represents only a momentary perplexity in the onward march of man. For we will in time invent techniques by which social bias of every type will be eliminated as successfully as the natural sciences established their rigorous standards.

Huxley states the creed of the past century in a nutshell. One could offer similar quotations from many belated children of the nineteenth century, still living in this century of perplexity. We must consider the modicum of truth in this position before dealing with its error. It is true that the social and historical sciences can invent endlessly more astute techniques for the detection of an ideological taint in the position of a class, in the idealism of a nation, or in the pretensions of an individual. Psychology and sociology each has its own way of dealing with the problem of rationalization, which is to say with the inclination of man to make the worse appear the better reason when

his interests are at stake. We can not afford ever to cease our vigilance or diligence in establishing honest rather than dishonest estimates of the hopes, fears, and ambitions of nations other than our own; or of the ideals and prejudices of an age different from our own; or the desires and ideals of any competitive force in life. But all of these disciplines cannot change the fact that the encounter between life and life, between nation and nation is something more and something less than a purely intellectual encounter; or that its problems could be solved by a purely intellectual means. These are encounters in which the whole of human personality is involved. In dealing with nature, the mind of man is at the center of the enterprise, and the human personality, with all of its hopes, fears, and ambitions, is on the circumference. Nature as such does not challenge our security. But in judging each other (and all social judgments are judgments of each other) the human personality is at the center of the enterprise and the mind tends to be the instrument of the hopes and fears of the personality. We arrive at proximate impartiality in society by relying upon groups which are not immediately involved in a dispute; and we seek to construct organs of government, particularly judicial instruments, which are relatively impartial. We are enabled furthermore to make relatively impartial historical judgments because there always comes an age which is sufficiently detached from the fears and furies of a previous age to view its tumults, as we say, impartially. Yet even that mode of impartiality has its limits. Let an historian, for instance, review the age of Jackson and let it appear that there are analogies and affinities between Jackson and Roosevelt. Then his judgments will be judged according to our present opinion about the virtues and defects of the New Deal.

There are, in short, no completely rational solutions for achieving disinterestedness either in our observation of the facts or in our actions. "Knowledge," says a modern philosopher, "is the achievement of a spectator who stands outside the scene which he observes, reports, and interprets. Only a spectator can meet the requirements of disinterestedness and objectivity."² Very true. But the difficulty is that in the

² Adams, George P. "Ethical Principles of the New Civilization," in *Our Emergent Civilization*, Ruth Anshen, editor. Science and Culture Series, Vol. IV. New York: Harper and Brothers, 1947. p. 198.

absolute sense there are no pure spectators in the human arena. We are all participants in the contests and struggles of history. The general increase in intelligence tends to increase the power of the contestants. Thus there has been a development from tribe to empire which is related to the growth of every form of human freedom. It also increases the number and complexity of relations between the individual and the collective agents in human society. But whether a man or a nation desires to live for the self or for the whole, whether the force of a life is primarily egoistic or social is not finally determined by the power of reason. Intelligence may well increase the range over which an egoistic force operates rather than the direction of its operation.

THE question of the purpose and direction of a life, the truly spiritual and moral question is decided not by the mind but by the self. The mind may well enlarge the sympathies of the self, it may overcome fears due to misunderstanding and create a degree of mutual trust, based upon the fuller understanding of the purposes of friend, foe, or competitor. There is even a possibility that pure logic can be made a servant of virtue, for a logical person may find it difficult to claim for himself what he is not willing to grant to another. There are all sorts of relations of the mind ancillary to the ultimate moral issue. Yet finally the self beyond the mind is engaged. Whether the excellency of another person incites my envy or my admiration is not determined by my intelligence but at a deeper or higher level of selfhood than my rational processes. Whether I am loyal or disloyal in the family relation or in any other intimate relation of mankind is an issue with which the self is confronted. Whether I use the weakness of another as the occasion for dominating or helping him is a moral and spiritual issue in which the whole self is involved.

While there is no collective self in the exact sense of the word, it is nevertheless true that the moral issues which nations face are also in a dimension different from that of pure reason. America must choose whether she will use her power to preserve her own security without reference to the weal and woe of the world as the isolationists would have us do; or whether we will use it to dominate the world as the imperialists would have it; or whether our power shall be used

responsibly for the wider organization of the community of mankind. It must be observed that the collective self, if there is such a self, never makes a purely moral, which is to say a purely disinterested decision. It may be that a wise self-interest is the highest level to which collective action may rise. This means that a great deal of social intelligence must enter into the right action of nations. We must learn that the alternative of isolation is not in our own interest in the long run because the interdependence of the modern world is such as to make isolation impossible. We may also learn something about the hazards of imperial dominion and the short shrift of the pride of powerful nations. These considerations may support virtue in our actions and check the most flagrant forms of vice. Yet finally the moral decision which confronts nations is met not merely by rational and prudential calculations. The self, either individual or collective, has or does not have a sense of responsibility beyond itself. Even at best that sense of responsibility is never as strong as is required either for the social peace and justice of a community or for the concord between communities. It is more difficult to preserve both justice and peace than the nineteenth century imagined. Governments are always partly coercive because individuals are not disposed to do voluntarily all things they ought to do for the common good. A world government requires coercive power over nations for the same reason; though it is obviously much more difficult to find the basis of a coercive great enough to bring the will of nations under its dominion than those believe who think that the world community waits merely upon the explication of an ideal system of world law.

Thus we face not merely the moral issue of how to do good and avoid evil in a deeper dimension than the previous century. We also face the perplexity that in the ultimate sense neither an individual nor a nation is as good, that is as disinterested, as the peace and justice of the larger community require. This raises a fundamental religious issue about the meaning of human existence. It raises the question about what life means if there is within us a disposition to violate in our actions some of our deepest insights about the meaning of life. Is there a resource human or divine which overcomes this contradiction? The whole of the Christian faith is in a sense an answer to that ques-

tion. But that answer has been regarded as irrelevant by modern culture because it did not take the contradiction within man himself seriously. It saw a certain tension between the passions of the flesh and the larger and more inclusive purposes of mind. But this tension would be resolved as mind became more powerful and brought all stuff of nature under its dominion. If it should be true that the contradiction within ourselves, the contradiction between what we are and what we ought to be, grows and develops and expresses itself more poignantly on a high than on a low level of culture, we would face an old perplexity about human existence in a new dimension.

If furthermore the inadequacy of man for his social task involves us in the kind of political perplexities in which we now stand, if history does not so simply fulfill our most cherished hopes but confronts us with the most terrible frustrations and with situations in which we can do no good without doing a great deal of evil, would we not then discover that the historical process, which was supposed to answer all human questions and fulfill all legitimate human desires, had itself become the chief perplexity of modern man?

IN RAISING such questions I do not want to suggest that schools of higher learning should not regard intellectual disciplines as their primary function. It is their business both to store the mind with adequate knowledge and to sharpen it as a tool. It is their business to elaborate every technique of knowledge by which man comes into effective control of the processes of nature and by which he learns to understand the destiny of nations and cultures, the rise and fall of civilizations, the intricacies of the human psyche, and the complexities of human relations in their economic, political, and other forms of togetherness. The university is not primarily a character-building institution. In a sense it can never have that function, primarily.

But it does make a difference whether the educational task is pursued with an understanding of the mysteries and perplexities of human character and destiny which lie at the side of this road of the elaboration of reason and knowledge, or whether it is believed, as the past century tended to believe, that these mysteries are no more than the residual ignorance of a more primitive culture which the ever broader road of learning will overcome.

In a sense the whole of our modern approach to these problems has been influenced by, or has unconsciously followed, the philosophy of Comte. Comte believed that mankind was moving from a theological to a philosophical, and then from a philosophical to a scientific age. In this development he assigned the second period, the philosophical, no more than the negative task of corroding the superstitions of religion, by the power of reason, thus making way for science and for the scientific solution of every ultimate and every social issue which faces human existence. There has indeed been something like such a development, at least in the sense that religion is older than philosophy and philosophy is older than science and that science is the latest and most prolific fruit of human culture. There is, however, a bare possibility that this development involves more perplexities than Comte understood. It may be that religion expresses a naïve profundity about ultimate issues akin to the naïvete of children and those who are unspoiled by a high culture. In our naïvete we may ask ultimate questions more successfully than in our sophistication. The answers are not broad as well as deep until philosophy arises to bring order out of the chaos of contradictory answers and to insist upon coherent and consistent world views and life views. Science follows—a final third stage. It fills the world picture and the life picture with every detail. It traces causal sequences upon every level of reality, natural and historical, biological and psychological, geological and astronomical. But there is the possibility that this third stage may result in a deterioration of culture. If, for instance, it is assumed that piling up many answers to many detailed questions puts us in the possession of more and more truth about ultimate questions, would not such a development represent a deterioration of culture?

Is there not a possibility that the philosophical passion for coherence and the scientific passion for coherence in detail may obscure the profound ambiguities and antinomies of human existence? Do we not tend to understand ourselves too simply either if we seek to understand man as a creature of nature who is only slightly distinguished from other creatures in nature; or if we try to understand ourselves primarily as rational creatures who are only provisionally bound to natural necessities? Is not the clue to the understanding of the human self the perplexity about the ambiguity of the self in its involvement

in and transcendence over natural process? And does not this same ambiguity exist in regard to the self's relation to the historical process, which is made possible by the unique capacity of man to break the harmonies of nature? Man is both a creature and a creator of history. He is not merely a creature of history as those assert who underestimate his unique freedom. But neither is he in the process of overcoming his ambiguity in the historical process until he finally establishes himself as the complete master of his own destiny. This ambiguity is a permanent fate of man. So also is the human tendency to overestimate his power and his wisdom and to deny his mortality.

We thus face the situation that a scientific culture which has added up many detailed facts about many aspects of human existence frequently arrives at superficial answers to ultimate issues. It certainly gave us many answers about our nature and our destiny which did not enable us to anticipate the possibility of a technically powerful civilization standing on the abyss of disaster. It does not offer us many resources for living courageously and serenely in an epoch of frustration and disaster, such as we are fated to endure for decades to come.

For such an age we require a faith which is neither too simply voluntaristic, overestimating the power of human decision in the vast patterns of human history; nor too simply deterministic, reducing man to an automaton within those forces. We require a faith which does justice both to the freedom of man and to the overarching patterns of life which are not answerable to his will, a faith which will avail itself of interpretations of human destiny which are not so simply rational.

We require an interpretation of the mysteries of human selfhood which equate the self with neither its mind nor with its purely physical impulses. Such an interpretation will avail itself of every insight which the psychological sciences may supply. But it will recognize an ultimate mystery of the self's free decisions and responsibilities, and know that the problem of whether the self will seek to live merely for itself or will seek to realize itself by losing itself in the larger life is an ultimate issue of life which is decided not as a rational but as an existential problem.

We require an interpretation of the complexities of human history which does justice to the vast antinomies and tragedies of life, the chaos

and cross purposes in human development, not as a chaos which belongs merely to yesterday and is being progressively eliminated but which is a permanent aspect of human existence.

The tendency of a culture which has solved the problems of life too simply is to move from complacency to despair. In Europe this despair is already fully developed. In our own nation we are just beginning to move from complacency to despair. A too simple faith in human virtue gives way to cynicism. A too simple faith in the power of human reason gives way to relativism and nihilism. A too simple faith in the redemptive power of history gives way to pessimism.

Our whole educational enterprise must be sensitive to these larger issues of the spiritual life. Whether it is philosophy or history or literature or any of the humanities which is the subject of our study, we are interpreting life to a confused generation in an age of great perplexity. This generation like every generation of mankind finally asks ultimate questions about the meaning of its existence. It is entitled to answers which contain more than the prejudices and illusions of an age of security. It is entitled to answers which draw upon the whole wisdom of the ages.

There is spiritual and moral value in every intellectual discipline of a great center of learning. But a greater modesty is required in the intellectual pursuits of an age of perplexity. That modesty must express itself in a realization of the realm of mystery and meaning which surrounds any area in which we have certain knowledge; and in a recognition of the profound tragedies and antinomies of human existence which are not easily brought into our simple schemes of meaning; and finally in a sympathy for every moral and spiritual discipline, whether in the academic process itself or ancillary to it, which deals with men in their wholeness and in their integrity as responsible persons.

THE SEVENTY-FIFTH ANNIVERSARY DINNER

Toastmaster:

HARLAN H. HATCHER, Vice-President, The Ohio State University

Speakers:

CARL W. WEYGANDT, Chief Justice, The Supreme Court of Ohio

JOHN B. FULLEN, Secretary, The Ohio State University Association

JAMES J. HURLEY, Consul, The Dominion of Canada

RAMON GUAL, Consul, The Republic of Mexico

DONALD C. POWER, Board of Trustees, The Ohio State University

KARL TAYLOR COMPTON, Chairman, Research and Development Board,
United States Armed Forces

HOWARD L. BEVIS, President, The Ohio State University

OPENING REMARKS

By HARLAN H. HATCHER

GREETINGS will be presented by Carl V. Weygandt, Chief Justice of the Supreme Court of the State of Ohio, and by John B. Fullen, Secretary of the Ohio State University Association. James J. Hurley, Consul, the Dominion of Canada, and Ramon Gual, Consul, the Republic of Mexico, bring a salutation from their respective countries. The Ohio State University has always been proud of its relationship with other countries, and in the course of these two days of festivity, the international aspects of education have been emphasized repeatedly. The University hopes that these two distinguished guests will express to their respective governments the best wishes of this University and its deep appreciation of their presence and their greetings.

From the very outset, this institution has had in its service some of the outstanding citizens of the state, who have served it faithfully and well as members of its Board of Trustees. During critical periods of the University's development, the Board has always furnished constructive leadership and has supported the leadership within the institution so that difficult transitions have been successfully made. Donald Power, a graduate of the institution, formerly a faculty member and now member of its Board, will speak for the trustees.

The main address of the evening will be delivered by Karl Compton who needs no introduction to an Ohio audience, since he is himself an Ohio man. Not only all Ohioans but all scientists, all men of learning everywhere, know his name and his achievements as a student at Wooster, as a student and physicist at Princeton, as president of Massachusetts Institute of Technology, as a man who has assumed the responsibilities thrust upon him by this nation during the second World War, particularly in the fields of radar and atomic energy. You know the long list of honors which have come to him. You also know that he is about to assume the very heavy obligation of chairman of the Research and Development Board of our Armed Services. The subject of his address will be "Science and Security."

The concluding remarks of the celebration commemorating the seventy-fifth anniversary of the opening of classes at The Ohio State University will be made by Howard L. Bevis. Many of you will remember the occasion eight years ago when he was inducted in this very hall as the president of the University. You will remember that we had gone through the depression. You will remember that the clouds of war were already gathering over us. During Howard L. Bevis' administration, it has been his responsibility to carry us first through those days before the war struck us, then through the difficult period of the war itself, through the readjustments necessitated by the twenty-five thousand students who came to our campus, and to project us into the future. Many of us who have had the very great privilege of working closely with Howard L. Bevis, love him, cherish and admire him no end for the leadership which he has been exerting in this institution in his usual quiet but none the less forceful and unswerving way to build here the kind of institution that we hope to see materialize in the period that lies just ahead.

RESPONSE
FOR THE PEOPLE AND GOVERNMENT OF OHIO

By CARL V. WEYGANDT

THE fact that I have been asked to speak for the people of Ohio and the government of Ohio means that I have the opportunity to express to the assembly this evening the greetings and congratulations of some seven millions of people. Everyone of us in the state is proud of this great institution, proud of the progress it has made, and proud of the service it has rendered. But may I venture the prediction that when we reassemble twenty-five years hence to celebrate the centennial, we shall look back to this occasion and realize that great as was the progress made in its first seventy-five years, The Ohio State University was in 1948 just getting rightly started.

RESPONSE FOR THE ALUMNI

By JOHN B. FULLEN

IN VIEW of the fact that this is a birthday party for a lady, it does seem a little strange that her age is displayed so conspicuously, displayed all over the room to her guests—in neon lights, no less! But when you remember that we are honoring one of the great ladies of higher education, the emphasis on her age is natural. In fact, the older our great lady grows the lighter will rest the years upon her shoulders.

The Ohio State University is in fact only a sweet young thing as universities go. You remember that just a while back Harvard celebrated her three-hundredth anniversary. In view of Ohio State's relatively brief years of service, I am sure that we may be indulged a pardonable pride if we sing her a panegyric as our contribution to these exercises. This beloved alma mater of ours has put seventy-five thousand of us through college and has scrubbed and combed twice that many more who did not finish for one reason or another. It was her outstretched hand which opened for us the door of opportunity. Through it we passed, each to seek out for himself what truth might be. She gave us nature's creatures to study, including man, the organism, as well as homo sapiens, the soul. She taught us to fashion the tools for man's hands and to build cathedrals for his spirit. She taught us to defend the accused, to lead the distressed, and to heal the sick. She opened new vistas in the distant universe for us. As a result, she has produced: a theologian like Gaius Glenn Atkins, a painter like George Bellows, a provost like Paul Herman Buck, an author like Dorothy Canfield, a research director like Lewis Warrington Chubb, a Big Brother like Ernest Kent Coulter, a missionary to India like Sam Higginbottom, a clergyman like Ralph Blake Hindman, a physician like Henry Spencer Houghton, an inventive genius like Charles F. Kettering, a journalist like Willard Monroe Kiplinger, a military strategist like General Curtis E. LeMay, an educator like James Lewis

Morrill, an actor and playwright like Elliott Nugent, a surgeon like George Thomas Pack, an historian like Arthur Meier Schlesinger, a humorist like James G. Thurber, a pathologist like Francis Carter Wood.

Last year 518 of the persons listed in *Who's Who in America* were children of The Ohio State University. This number was 1.3 per cent of the 40,000 names appearing in that lexicon of the illustrious.

As a result of what she taught us in her laboratories and classrooms, her graduates have developed for the world such things as the altimeter for airplanes, nylon and cellophane, the iceless refrigerator, the modern diesel engine, and cobalt 60 for cancer. This illustrative list of names and of contributions to mankind could be amplified many, many times as you know.

Not all of us have built cathedrals, but we have built homes and reared families and have shown what enlightened and useful citizenship might be. Because of her ministrations we were better equipped to answer the call to the work of the world and to discharge our obligations as beneficiaries of state-supported education.

Is it any wonder, then, that we glory in this opportunity to bring to our academic mother prideful felicitations and best wishes for an even more distinguished future? We greet her fondly now and say, "Happy birthday, many happy returns of the day."

RESPONSE FOR THE PEOPLE AND GOVERNMENT OF CANADA

By JAMES J. HURLEY

IT is a high honor for me to be here this evening, enjoying with you your seventy-fifth birthday party. I have heard wonderful men give wonderful addresses in each of which there was a wonderful message. I regret, indeed, that some of our eastern friends could not appear. I am directed, Mr. President, to convey to you, the sincere regrets of our ambassador in Washington, the Honorable Hume Wrong, at his inability to be present. Other commitments forced him to refuse the invitation. His bad luck, may I say, is my good luck.

For the last nine years I have been given an opportunity to see, talk with, and form an impression of the thoughts of, the people of western Europe in all their countries. And I should like to tell you tonight of their very high idea of you and your country. They have seen your statesmen and your soldiers who have made very fine ambassadors, perhaps the best possible ambassadors that you could have sent abroad.

Europeans like the versatility of the Americans, their obvious competence and confidence in themselves, their youthful outlook; Europeans have come to like your way of life. They are deeply and sincerely eager to have your support, your counsel, your friendship, and above all your leadership.

You came out of the World War, the second one and I hope sincerely the last, a giant among nations. To you has fallen the leadership of the democratic states. You have willingly and unhesitatingly accepted that responsibility, which is a deep one. I like to think that part of your willingness and your ability to accept responsibility has been induced in you by your system of education, which is known throughout the world and exemplified by the seventy-five years of achievement of such an institution as The Ohio State University.

These people need the help which I know you are going to give them. We, in Canada, have every confidence in you as leaders of the

democratic states. We who are so closely bound with you and know you perhaps better than the other countries have complete faith in you. Therefore, I am very happy tonight to bring on the part of Canada congratulations to The Ohio State University for its seventy-five years of achievement, and Canada's best wishes for an undoubtedly great future.

RESPONSE FOR THE PEOPLE AND GOVERNMENT OF MEXICO

By RAMON GUAL

I HAVE accepted this invitation to be present at the observance of the seventy-fifth anniversary of the opening of the doors of The Ohio State University, known not only to the youth of your state and your nation, but to the world. I am very pleased to be here with you, to be identified with the notable personalities gathered at this banquet, and to share your aspirations, hopes, and purposes. It is with great pleasure that I bring in the name of Mexico, my beloved country, and in the name of our President, His Excellency Miguel Alemán, the warm salutations of the people of your closest southern neighbor, that country below the Rio Grande, where all Americans are held as good friends and neighbors.

This magnificent event, that crowns long years of outstanding educational attainment, will be remembered in the decades to come. But also remembered will be the state of uncertainty we are in as our leaders try for the final settlement of a just peace and for the liquidation of the hideous remains of war that have despoiled so much of mankind.

We all know that one of the principal difficulties in the settlement of disputes in Europe arises from the task of understanding the many different languages spoken there. In the Western Hemisphere we have a simpler problem. Through the conferences of the Pan American Union and other inter-American congresses, mutual understanding is being developed gradually, but we could go faster and further if our universities could succeed in combining their efforts toward the furtherance of widespread English-Spanish bilingual education. The goal of mutual understanding would be more speedily reached if we would train teachers who from primary schools on could teach Spanish and English at the same time, in order to prepare our youth to read the news, to familiarize themselves with books and periodicals in both of the great languages of the New World, and to be able to know the

history, geography, the customs, and traditions of the countries on this continent.

Mexico is making every effort to accelerate education. Our government is increasing the number of schools in every state of the Mexican Republic, giving special attention to primary and agricultural schools. Much has been done in the last decade to reduce illiteracy, and we Mexicans are proud to say that education in Mexico is being developed efficiently. Normal schools prepare a great number of teachers annually; the National University of Mexico, one of the oldest in America, and all our other universities are in the forefront of the battle.

Mexico City should be considered by the universities and colleges of this marvelous country as a place of meeting with the universities and colleges of the other Americas to confer on establishing standards which would bring good results to all. The Ohio State University is already familiar with some of the educational facilities Mexico has to offer.

Again I express my gratitude for the invitation to share with you this momentous occasion, and I leave with you the greetings of the people of the Republic of Mexico along with my personal wishes for your everlasting prosperity.

GREETINGS FROM THE BOARD OF TRUSTEES

By DONALD C. POWER

TONIGHT's dinner is a culmination of the formal celebration of the seventy-fifth anniversary of the founding of The Ohio State University. I am certain that all of us here, as well as thousands of the University's sons and daughters everywhere, have rejoiced in this occasion. Yesterday, as I stood on the steps of old University Hall, where The Ohio State University had its physical beginning, and looked across the present campus, I experienced a feeling of great pride in our University. As far as the eye could reach, there were fine buildings. Everywhere there was evidence of the new building construction now in progress which, according to the present building program, will aggregate upwards of \$25,000,000.

These are great days for this University. A generous grant by the legislature for the expansion of the physical plant, some \$22,000,000 in all, was matched by the Ninety-Seventh General Assembly with an unparalleled amount of \$24,491,000 for operation of the plant. No private university in America has an endowment that will produce that kind of an income. This spring one of our most satisfying acts as trustees was to approve President Bevis' recommendation for new floors under faculty salaries. Thus, we have been able not only to increase our teaching staff to meet the demands of an unprecedented enrollment but also we have been able to maintain the high quality of our personnel and to attract some of the best people in the country to the various fields of economic and educational research. The continuance of such a program will enable us to do a constantly better job in the teaching and research fields; the quality of accomplishment in these fields is the real test of any university.

Many of you alumni from different parts of the nation are thrilled with the rapidity with which our new buildings are going up. Soon, as our President says, we shall have so many holes in the campus that a lantern will be recommended if you travel around at night. How happy are we to see the new music building so far along. The contractors are about to pour footings for the new physics building. The

medical center is ready for the second floor. The service building will be completed this spring. And very soon, construction will begin on the addition to the commerce building. Some time next year present plans anticipate a new five-million-dollar Student Union building. But we are proudest of all of the plans for the library which will add an addition costing two and one-half million dollars to that building which is the very heart of our University. In all, present expansion plans will almost double the present investment in the physical plant which it took seventy-five years to accomplish.

All these evidences of growth and development are gratifying. So interested have the trustees become in this program that in addition to our monthly meetings of the past several years, we have been giving three solid days to a summer meeting in which we have dreamed some dreams for the next twenty-five years of this University. Yes, it is now to the future that we must all look; we have done well in the past years but we must grow, progress, and do better. The attitude of the Board of Trustees with respect to the university of tomorrow was aptly expressed by our most renowned member, Charles F. Kettering, when he said, "I'm interested in the future because that is where I expect to spend the rest of my time."

I am sorry that all of you have not had our opportunity to become familiar with the plans for the future. Those plans are large and call for a literal rebuilding of much of our present campus. Of course, conditions from time to time may necessitate the changing or modification of those plans, but the important thing is that we do have plans which have been reduced to writing and will serve as a guide to chart our future course. It has been said that there were times in the past when the University did not know where it would plant the next bush. Today, I assure you we have definite ideas as to where each bush and building will be placed for several years to come.

On this seventy-fifth anniversary of the founding of The Ohio State University let us pause to reflect on what is past, but then let us resolve henceforth to put all our energies and abilities toward the realization of present hopes and ambitions for a glorious university of tomorrow. I do not believe that the seventy-fifth anniversary could have come at a time more propitious for celebration. I am sure that

many of you have glowed with pride at the fine compliments paid this institution by the scholars, the scientists, and educators who are honoring us with their presence during our time of self-congratulations. Let us assure you that none of you have smiled more brightly at these generous comments than your trustees Herbert S. Atkinson, General Carlton S. Dargusch, Charles F. Kettering, James F. Lincoln, Warner M. Pomerene, Lockwood Thompson, and myself. There are times when even trusteeship can be an unmitigated pleasure, and this happy birthday party is one of them.

SCIENCE AND SECURITY

By KARL TAYLOR COMPTON

THERE are many reasons I deem it a privilege to be here on this occasion. In the first place it gives me a personal opportunity to bring to The Ohio State University greetings from the Massachusetts Institute of Technology which is only a few years older than your institution.

In the second place, I am very happy to appear again on the same platform with President Bevis. A year and a half ago we and our wives went on a barnstorming expedition to Hawaii to participate in the fortieth anniversary celebration of that young, very interesting institution. I think neither of us ever had a more delightful time or made so many speeches within a period of two weeks. How either we or our audiences survived I shall never understand, but the trip did give me a much valued opportunity to become acquainted with and to admire the fine personal and intellectual qualities of your president.

My third reason is also a personal one and goes more than half-way back in your history. As an Ohio boy I naturally had many contacts with The Ohio State University. I think the first of these was when I used to hear my father tell about the delightful meetings of the Rhodes Scholarship Committee in the home of your President Thompson; father always came back with great praise and admiration for that educator and Christian gentleman. Only recently retired from your staff is Lynn W. St. John, who served you as director of athletics and professor of physical education, but who earlier was my coach in baseball and football during my college days at Wooster. He probably had more to do than any other person except my parents with the molding of my character; and such faults of character or training as persist are there in spite of his influence, not because of it.

If I could remember chemical equations and molecular structures as vividly as I can remember some of the baseball and football games in the period just following the introduction of the forward pass, I perhaps might have been a great chemist. If by any chance in this

audience there are certain gentlemen—I cannot remember them all, but I remember “Rink” Barrington, a great quarterback and shortstop; Bryce, another quarterback; Jim Lincoln, a tackle who was just as fast as he was big; Schorey, a halfback; Schachtel, Lawrence, and Postle (a pitcher)—if any of those men or their teammates are in this audience, my compliments and best wishes.

For all these reasons which I have mentioned, you can well understand with what warm personal feelings I appear before you tonight. But let me proceed to the more serious part of my discourse.

WE ARE living in a troubled world, full of intricate and unsolved problems which are our heritage from World War II and are enhanced by conflicting ideologies and by the reluctance of great groups of people to make the sacrifices necessary either to ameliorate or to control the situation. We in America want protection of our lives, our property, and our own business. We also want peoples in other lands to be protected from aggression—this partly from general humanitarian motives of sympathy and friendship, and partly for the reason that if other peoples are subject to aggression, so, sooner or later, may we be. For such reasons we the people want security.

In the report of the President's Advisory Commission on Universal Training, made in May of last year, this Commission analyzed some of the more important factors which can promote security. It stated that “at the root of all the Commission's thinking is the conviction that the only real security for this country or any country lies in the abolition of war through the establishment of a reign of law among nations.” It pointed out that the United Nations is the embodiment of our hopes for a durable peace based on justice and co-operation, rather than violence and death. The Commission declared that we must in every way support the United Nations in its efforts to achieve this goal, but we must admit that the going is slow and rough and that for the time being at any rate it behooves our country to take supplementary steps to maintain its security.

Among these steps our Commission emphasized the following: a strong, healthy, educated population; a healthy economy reflected in full production, full employment, and industrial peace; a high general

level of education throughout the country; improved physical and mental health; and an understanding of democracy with an increased feeling of personal responsibility on the part of every individual for making democracy work as a co-operative enterprise.

Furthermore, the Commission recognized the need of a co-ordinated intelligence service, of industrial mobilization and stock-piling, of a strengthening of the regular Armed Forces and unification of their command, of universal military training, and of a vigorous program of scientific research and development.

Thus there are many factors involved in a full program for national security. The most important of all factors, "good will among men," is a goal which we can all strive for, but unfortunately it is not a goal which we have under our exclusive control. Some of the other factors, however, are under our own control, and among them is the influence of science on our security. This influence can be developed in two ways: first, by the contributions of science to health and to a sound industrial and agricultural economy; and second, by the contributions of science to the arts of defensive or offensive warfare which have become of such terrific significance. In both of these aspects of science as a contributor to security, we have many causes for satisfaction and some reasons for concern. Let me mention some of them.

We have now a far greater public awareness than ever before of the value of pure and applied science to our economy. Many facts demonstrate this. One is found in the budgets for scientific research in our universities. I have no up-to-date, over-all figures on this item, but I know that our higher educational institutions were spending about thirty million dollars a year on research just before the war, and I believe the figure is now double that, though a large part of it is now coming through government contracts and industrial grants.

On the industrial research side are the following figures which are found in a recent bulletin from Stanford Research Institute. In 1915 there were 100 industrial research laboratories, employing 3,000 people; in 1920 there were 300 laboratories, employing 9,300 people; in 1946 there were 2,500 laboratories, employing 133,500 people. The annual research and development expenditures by industry, as listed in the Steelman Report, *Science and Public Policy*, increased from \$116,000,000

in 1930 to \$234,000,000 in 1940, and are expected to reach \$500,000,000 in 1950.

Governmental expenditures for research and development were \$67,000,000 in 1940, and will probably be about \$500,000,000 in 1950, according to the Steelman Report. Furthermore, in the last two successive years, Congress has almost passed legislation to establish a National Science Foundation, in recognition of the importance to our country of a considerably accelerated program of scientific research which will go beyond the capacity or present willingness of private organizations or individuals to carry the full financial responsibility.

It is significant that in public discussions in the press, in Congress, or by national leaders, while there may be disagreement on most other national policies, there seems to be no disagreement with the thesis that the strength and welfare of our country require an active program of research to discover new knowledge and a program of development to apply this knowledge to meet human needs.

One of the most heartening factors recently has been the "new look" which many important industries are giving to their own opportunities and responsibilities for support of scientific education and research in universities. Some companies have adopted extensive programs of scholarships and fellowships; others have been contributing generously to meet the new scientific and engineering needs of our educational institutions. Many large industrial organizations have appointed committees of their operating officers to review the question of the company's role in these matters and to make appropriate recommendations for more liberal policies. All are simultaneously enlarging their own internal research activities.

In listing these various lines of favorable evidence I should also emphasize the actions which have been taken by many state legislatures to provide new capital facilities and increased operating funds to enable their state universities to play their appropriate role in this increasingly scientific era.

All this is far from saying that the needs and opportunities in science have been completely met. For example, the institution which I serve estimates that \$20,000,000 of new capital facilities of buildings, laboratories, and equipment, plus \$10,000,000 of additional endowment

or its equivalent, represent our present really urgent need for things which are necessary to keep up with the field of technological developments and to carry on the scientific projects which are now clearly defined: \$10,000,000 of this has recently been raised; \$20,000,000 is still needed. I know that a similar situation, on a larger or a smaller scale, now confronts all of our institutions of higher education.

On the military side the story is very similar. More funds and more activity are found in research and development than ever before in peace-time. For over-all co-ordination, study, and direction there has been established a Research and Development Board, operating directly under the Secretary of Defense. In the postwar effort to cut down expenses of the military establishment, scientific research and development were treated with especial generosity. I have heard it claimed, though I cannot vouch for the literal accuracy of the statement, that the Congress has never cut a requested appropriation for research for the Armed Services. Such cuts as have been made in the estimates of needs have been made by the Executive Department and not by Congress. This is certainly true in general, although there may be exceptions, and I think it is significant as an indication of popular recognition of the role of science in our security.

Also new in this whole picture is the tremendous atomic-energy program, financed almost completely by public funds, operated principally by industrial companies or educational institutions under the over-all planning and supervision of the Atomic Energy Commission. The stakes here are tremendous for either peace or war. Undoubtedly the potential development of atomic energy is still in its infancy. Some one has described our present status of atomic power as about equivalent to that of steam power when James Watt first noticed that the steam lifted the lid on his mother's teakettle.

BUT over and beyond the considerations of security which involve concentration on problems of the near future—problems like full employment for security of jobs, business prosperity for security of standards of living, and military preparedness in these troubled times for security against international aggression—there is another aspect of security which is beginning to loom on the horizon. It is a long-term

problem which affects the entire human race and which is causing great anxiety among the relatively few who have given expert thought to the problem. I refer to the problem created by rapidly increasing populations on the one hand, and by the steady exhaustion of those natural resources of soil, minerals, and fresh water on which the human race depends for its existence. Books like Fairfield Osborn's *Our Plundered Planet* are beginning to portray the stark inevitability of a catastrophe which may not be many generations off unless some very strenuous measures are taken to prevent it. We already know, for example, that approximately one-third of the soil fertility of our United States has been lost by erosion or by failure to replenish in the soil those essential elements which are extracted from it by repeated crops. We know that this is the process which was basically responsible for the decline and fall of ancient empires in Egypt and the Middle East. We know that it is presently a desperate problem in the highly populated and long inhabited areas of Asia. We know that there is very little leeway in the future for meeting this problem by the discovery and exploitation of presently primitive areas. I have been told, just to take one example, that the supply of lead which is believed to be economically available will be exhausted within about ten years at the present rate of consumption. There has been extraordinary success in the discovery of new oil fields, but we all know that this cannot continue forever. Even the present populations and the demands of our modern civilization for fresh water are exhausting the supply more rapidly than it is replenished over very large areas of our own country.

This is probably the most important fundamental problem which is facing the human race. It is partly a sociological and partly a political problem, but it is equally importantly a scientific problem because basic to any social or political actions, must be scientific analyses of the problem, the technological development of substitutes for depleted materials, and the discovery of methods for using those materials which we still have far more intelligently and efficiently than they are being used at present. One person has expressed this problem by saying that "it is no longer a question of natural resources but of intelligent resourcefulness."

Therefore while we are immersed in a consideration of our present

economic, political, and international problems, and concerned with our security on all of these fronts, there looms in the background with an importance which becomes greater with the passage of every year, this greatest of security problems and of challenges to science—namely, the ultimate safety of the human race and the threat of its decline, even down to the stage of a bare struggle for existence on this planet.

What I have said about the significance of science to our economy and to our military security is well known. I have mentioned these points only for background and for emphasis on their importance. Let me speak now of the other side of the picture. What are some of the things, other than lack of funds adequate for the work in sight, which are standing in the way of our ability quickly to reap the potential benefits from science?

The first of these limiting factors is the shortage of qualified scientists to carry on effectively the research programs which can now be clearly outlined, and of adequately competent development engineers to carry forward the desirable practical applications based on this scientific progress. The field of nuclear science and atomic energy is the most outstanding example of this shortage. There are exciting new developments in the field of medicine and nutrition which present clear opportunities far beyond the ability of the men presently trained in these fields to exploit promptly. Many other examples might be cited. This is a limitation of which our educational institutions are acutely aware because we encounter it in our attempts to recruit adequate teaching staffs; we also encounter it in the demands which are made upon us by industrial and governmental organizations to recommend graduates competently prepared to undertake the various tasks in the governmental and industrial development programs. This shortage of trained personnel was illustrated by the case of a young man at our institution who recently received a doctor's degree. Without any solicitation, he received more than forty offers of jobs. If there had been forty men similarly trained, all of them could have had jobs.

Much is being done to meet this emergency. The fact that our educational institutions are crowded to capacity is one bit of evidence. The way in which various governmental agencies like the Atomic Energy Commission and the Office of Naval Research, as well as

various forward-looking industries, are making funds available to our educational institutions for research, permits these institutions to employ promising young men and thereby not only to carry on the desired research, but in the same process to develop a more numerous group of highly qualified scientific workers. This is one of the most encouraging aspects of the present situation.

In spite of these favorable factors, however, we are not meeting the demand as effectively as we might. Many of our educational institutions are limited seriously in what they can do by the lack of major facilities which are necessary to tackle effectively the problems in some of the newly developing technological fields. On the human side, as distinct from physical facilities, many surveys have indicated that we are failing to give adequate educational opportunity to a very sizable portion of our population which is qualified to take advantage of these opportunities.

This point has been strongly emphasized, for example, by my friend, President James B. Conant of Harvard University, in his appeal for education in a "classless society." He calls attention to the substantial portion of our secondary-school graduates who have the undoubted ability to profit by a higher education but who are prevented from doing so either for financial reasons or because of a narrow perspective of opportunity, and he points out that all such cases represent definite failures to utilize effectively our potential human resources.

If we go back of higher education and consider the universal problem of our public schools, we realize how imperfect is our effort to educate our youth along the lines of the very great concept of public education. When a town dog-catcher or comfort-station attendant commands a salary higher than that of a public school teacher, and when a very substantial portion of our public school teachers have to be engaged on an emergency substandard basis because of lack of applicants with full qualifications, we realize that the utilization of personnel in the interests of our over-all economy and security leaves much to be desired. The development of scientists and technologists is only one part of this more general educational problem, but it is an important part and at the present time it is one of the "bottlenecks."

I have called attention to some of the limiting factors which stand in the way of the most effective possible utilization of science for the insurance of our security. Funds, facilities, and personnel are all intimately related aspects of this limitation, and I think it is clear that the removal of these limitations depends in the last analysis on public understanding of the matter and on a sufficiently alert interest in these problems to bring about those actions which will permit their better solution. These actions involve primarily two things: more adequate and more permanently assured financial support on the one hand, and a public concern which will give increased opportunity, prestige, and attractiveness to the educational, scientific, and engineering professions on the other hand.

IN CONCLUSION, I should like to discuss the subject of science and security from quite another angle, an angle based on an understanding of what security means when used in the narrow military sense.

At all times, and especially in time of war, it is necessary to maintain a high degree of secrecy in certain matters which, if known to the enemy, would give him an advantage and put us at a disadvantage. This secrecy applies, of course, to all types of military planning and operations. Because of the enormously increased importance of modern scientific developments as applied to warfare, this secrecy has also been very important in connection with the design and contemplated use and even the very existence of new weapons. The atomic bomb is the outstanding recent example, but there are many others such as the possibilities of bacteriological warfare, new types of airplanes, new methods of detection and destruction of enemy planes or submarines, various types of countermeasures against possible enemy actions, and the like. I think no one can properly question the justification and high importance of maintaining adequate secrecy on these points. This fact has been so well recognized that in military parlance and often in the public mind the words "security" and "secrecy" are used synonymously. What I wish now to discuss is the relationship between security and secrecy, with especial reference to scientific developments which may be of military importance.

There are two aspects of security, just as there are the two aspects of warfare which we call offensive and defensive. While defensive measures and precautions have to be taken, it is a generally recognized principle that a strong offense is the best defense. An analogous principle applies, I believe, in the matter of security.

Our security in technological matters having to do with warfare rests fundamentally on our being as far as possible ahead of our unfriendly competitor. To be in this favorable position we should prevent our competitor from learning our secrets, which is the defensive aspect, and we should work actively to make significant advances in our own technology, which is the offensive aspect. Neither of these should be neglected. It is evident that if we proceeded actively with our technological developments but at the same time published them broadcast everywhere, we would permit our competitor to keep pace with us at relatively little cost to himself. At the other extreme, if we should simply sit tight and hold on to our secrets, it would not be long before our competitor had forged ahead of us. Somewhere between these two extremes is the best procedure—and by best I mean the procedure which will give us the most advantageous relative position.

Unfortunately in this case secrecy and progress are mutually inimical, as is true of all progress in science whether for military purposes or otherwise. Science flourishes and progresses in an atmosphere of free inquiry and free interchange of ideas, and under the continual mutual stimulation of active minds working in the same and related fields. Any element of secrecy which is imposed on this activity acts like a brake to progress. It is for this reason that the most advantageous path between these two extremes of secrecy and progress is difficult to define, and because of this difficulty I believe there is much confusion in public thinking on the subject. It is much easier for the average citizen to understand secrecy than it is for him to understand the conditions necessary to scientific progress.

It is probably for this reason, among others, that there is such a furore at the present time about the possible leaks of secrets; all who are closely concerned with our scientific progress in military affairs are aware of the fact that the results of this publicity and of some pro-

cedures of official investigating groups have had seriously detrimental effects on our progress toward security through scientific research and development. It would be better, I believe, to take the carefully calculated risk of allowing some confidential information to get out of our hands, if such a policy would enable us to advance our own science and art at a more rapid rate than a competitor could hope to equal, than to impose by regulations or public opinion a condition which seriously handicaps progress by rendering employment in these pursuits definitely unattractive to top-flight scientists and engineers who have plenty of other opportunities to turn their talents into more comfortable and usually more productive activities.

I am one of the large group of scientists and engineers who are strong advocates of national military preparedness at this time but who are greatly worried over the detrimental effects on our work for technological preparedness of the barrage of publicity regarding alleged espionage and of the charges which have been made against reputable scientists on the basis of hearsay and unsubstantial evidence. I confess that when I read what appears in the papers about some of these cases I generally get the impression that the cases are very serious indeed and that the individuals concerned are very bad actors. This may actually be true in some cases. What bothers me, however, is that in the cases of individuals whom I have known personally and intimately over many years, my knowledge of the character of the men and of the circumstances on which the charges are based convinces me of the very flimsy nature of these charges and of the great injustice which is being done to the individuals concerned. I am only one of many hundreds, and perhaps thousands, of scientists who find themselves in this situation.

WHAT is most needed is to recapture in the public mind, and in the attitudes of the scientists who must do the jobs at hand, that spirit of confidence in and enthusiasm for their work with which we emerged from the war. At that time the public very properly applauded and supported the remarkable technological achievements which played so important a role in our victory. The scientists had great personal satisfaction in having been able to contribute thus substantially to our national effort. If that spirit is maintained we shall

make great progress toward the further contributions of science to our national security. If the recent trend of suspicion and lowering morale continues we shall be in really serious danger.

Some of these points were strongly emphasized by one of the men who is most responsible for our security through science, David E. Lilienthal, chairman of the Atomic Energy Commission. In his address before the American Association for the Advancement of Science on September 16, he said:

First: America's leadership in this new and fateful field of knowledge requires a stupendous effort. The notion that our atomic energy leadership depends upon a "secret formula," locked in a vault, is nothing less than a gigantic hoax upon the people of this country.

Our leadership depends upon developing new knowledge, and the new applications of that knowledge. Guards, and fences, and investigators—all these have a place, an important place. But guards and fences and investigators do not develop new knowledge about atomic energy, nor new applications of knowledge. And our position in the world and our progress in this field requires that we know more and more, and that we know it first.

.....
I recognize that for a long time there has been a reluctance to enter Government service, for a variety of reasons which have been discussed many times. But that service has now taken on an extra, an added unattractiveness, an added disability: the risk of undeserved injury to a man's good name, his professional standing and his peace of mind through anonymous vilification, through attacks from what may be petty or prejudiced or malevolent sources.

Piled on top of all the other familiar disabilities of public employment, this often makes work for the Government appear as something to be shunned. Public employment has become, in a very real sense, a hazardous occupation. The possibility of public pillory, so often unjustified and beyond immediate redress, does indeed cast a shadow of fear over public service. The growing concern of scientific and technical and managerial people is evident on every hand. The trend shows that as between private industry, educational institutions, and Government, Government is regarded as the least desirable employer by most scientists. Leading scientific and technical people have warned that the sources of talent are being closed to Government.¹

¹ "Public Employment or Public Pillory?" *Bulletin of the Atomic Scientists*, IV (October, 1948), pp. 293-94.

These words of David Lilienthal express better and more authoritatively than any words of mine the problem which I have been discussing. It is desperately important in this period of international uncertainty that the present trend be reversed and that the work of scientists and others who are engaged in efforts to promote our national security should again have the public support and commendation which they deservedly received at the end of the war when the public was made aware of their great contributions to our victory. Only then will the people who are so much needed in this work and who wish to enter it from a patriotic motive be enabled to do so with enthusiasm and not be forced to view it as a duty, at best distasteful, at times dangerous and to be shunned.

This is far from the first time that misguided or uninformed public opinion has stood in the way of progress and security. From the minutes of a Select Committee of the House of Commons in Great Britain in 1879 appears the following quotation from a speech by a member of the London School Board:

Geography, sir, is ruinous in its effects on the lower classes. Reading, writing, and arithmetic are comparatively safe, but geography invariably leads to revolution.

.....
The whole effect, sir, of extra subjects is to diminish the fierce virtues of an ancient people.²

We can hope that time, education, and better understanding can bring about gradually more intelligent consideration of the basic public problems which I have described tonight. There is some evidence that we can make progress. Compare the present state of public opinion on scientific matters in general with the following statement which comes from the records of an Ohio school board in the year 1828:

You are welcome to use the schoolroom to debate all proper questions in, but such things as railroads and telegraphs are impossibilities and rank infidelity. There is nothing in the word of God about them. If God had designed that His intelligent creatures should travel at the frightful speed of 15 miles an hour by steam, he would have foretold it through His Holy prophets. It is a device of Satan to lead immortal souls down to hell.³

² Quoted by Isaiah Bowman in *Technology Review*, XXXVIII (October, 1935), p. 19.

³ *Ibid.*

Unless we have a catastrophe we can hope that ultimately these difficult questions of public policy, which concern science and many other things, will receive a better understanding and handling than they have at present. But in some of the situations which I have mentioned the time may be short and it is important that this understanding be exercised very promptly.

I can find no better way of epitomizing the various thoughts which I have expressed in this address than by quoting Pasteur, who said: "In our century science is the soul of the prosperity of nations and the living source of all progress. Undoubtedly the tiring discussions of politics seem to be our guide—empty appearances. What really leads us forward is a few scientific discoveries and their applications."

Science and security have been the subject of this address. In it I have emphasized the importance of science and its proper handling because they are important and are matters with which I and many of you are especially concerned. Science and security are not the only agencies and objectives which are of vital importance—far from it. Others on this two-day program who are qualified to do so have spoken far more effectively and with equal justification on such subjects as security and ethics, or security and religion, or the need for moral rearmament. These are all essential aspects of successful living in this complicated world which is populated by a complicated array of nations and races, each composed of complicated individuals like you and me. What this complicated situation requires is for each one of us to do his best with all the intelligence and all the high-minded motivation which he can put into the job. It is the primary function of this great educational institution to train young men and women to perform effectively in this spirit. The Ohio State University has made a great contribution to the life of our country in the past seventy-five years, and unquestionably it will carry on into the future this splendid record of public service.

CONCLUDING REMARKS

By HOWARD L. BEVIS

I wish to take this opportunity to thank Vice-President Hatcher, Jim Fullington, and the really considerable host of people whom they mustered into service to bring this celebration into successful being. The patient and earnest work that has been done by all who have contributed to the success of our birthday party merits a word of highest esteem. I wish to thank the press for the generous support which they have accorded us from the beginning of our preparation to the present time. I wish also to thank the radio stations for the generous treatment which they have given The Ohio State University. I wish to thank those who have come to us from other institutions to share with us this celebration of our seventy-fifth anniversary. I wish especially, of course, to thank those who have appeared on our program. Seldom has there been a more illustrious gathering of intellectual life at one time on any college campus. And it has been a source not only of pride but almost of wonder to me that these several speakers who began at points so divergent around the periphery of human effort came to conclusions which ran in parallel courses and toward common ends. We asked you to come here to give your co-operation and help. I think it is fair to say that only in the fraternity of educated minds lies the hope of world unity without which man must go back into the jungle from which he came with such painful effort. The hope of that unity has been greatly fostered by your presence here with us and the co-operation which we have felt in all that you have done and said while here.

With a prayer on our lips for the great cause which we all serve, we bid you Godspeed. We are heartened by your fellowship, and our gates will always be opened to you when you return.

THE DELEGATES AND REPRESENTATIVES

THE DELEGATES FROM COLLEGES AND UNIVERSITIES

In Order of Their Foundation

- 1636 Harvard University.....Paul Herman Buck, A.B., Ph.D., LL.D., Litt.D., L.H.D.
 1701 Yale University.....Lorrin Cooke Tarlton, B.A.
 1740 University of Pennsylvania.....John Milton Fogg, Jr., B.Sc., Ph.D.
 1746 Princeton University.....Richard Francis Sater, A.B., LL.B.
 1754 Columbia University.....Edward Dauterich, Jr., B.Sc.
 1764 Brown University.....Earl N. Manchester, B.A.
 1766 Rutgers University.....James L. LaPoc, Ph.B., M.A., Ph.D.
 1769 Dartmouth College.....Albert R. Chandler, A.B., Ph.D.
 1785 University of Georgia.....Earl Stuart McCutchen, B.F.A.
 1787 Franklin and Marshall College.....Richard D. Altick, A.B., Ph.D.
 1787 University of Pittsburgh.....Herbert E. Longenecker, B.Sc., M.Sc., Ph.D.
 1788 Georgetown University.....Ernest Cornell, LL.D.
 1789 George Washington University.....Milton Lee Dennis, A.B., LL.B.
 1789 University of North Carolina...Jefferson Barnes Fordham, A.B., M.A., J.D., J.S.D.
 1791 University of Vermont.....Lester Lee Woodward, Ph.B., M.S.
 1793 Williams College.....Walter Jeffrey, B.A.
 1794 Bowdoin College.....Melcher Prince Fobes, A.M., Ph.D.
 1802 United States Military Academy.....David Warren Gray, B.Sc.
 1804 Ohio University.....John Calhoun Baker, A.B., M.B.A., LL.D.
 1815 Allegheny College.....Harry Lester Smith, A.B., A.M., D.D., LL.D.
 1817 University of Michigan.....Russell Alger Stevenson, B.A., M.A., Ph.D., LL.D.
 1818 Colby College.....Henry Russell Spencer, A.B., A.M., Ph.D.
 1819 University of Cincinnati.....Raymond Walters, M.A., Litt.D., D.H.L., LL.D.
 1819 Centre College of Kentucky.....Ewing T. Boles, B.A.
 1819 University of Virginia.....Henry Harrison Simms, B.A., M.A., Ph.D.
 1821 Amherst College.....Samuel Henry Cobb, A.B., B.P.E., M.A.
 1824 Kenyon College.....Gordon Keith Chalmers, A.B., M.A. (Oxon.), Ph.D.,
 LL.D., Litt.D., L.H.D.
 1826 Lafayette College.....Anthony Ruppertsberg, Jr., B.S., M.D.
 1826 Western Reserve University.....Norman Kunham Lattin, A.B., J.D., S.J.D.
 1827 University of Toronto.....Robert Victor Zumstein, B.A., M.A.
 1830 Randolph-Macon College.....Thomas L. Kibler, A.B., M.A., Ph.D.
 1831 Denison University.....Cyril Fuller Richards, B.S., B.D., A.M., L.H.D.
 1831 New York University.....William Charvat, Ph.D.
 1831 Xavier University.....Celestin J. Steiner, S.J.
 1833 Oberlin College.....John Herbert Nichols, A.B., M.D.
 1834 Tulane University.....Carroll Joseph Peirce, B.E., B.Sc., M.Sc.
 1836 Emory University.....William Fletcher Quillian, Jr., B.A., B.D., Ph.D.
 1837 De Pauw University.....Claude Garrison, B.A., B.D., D.D.
 1837 University of Louisville.....Maurice Gray Buckles, M.D.
 1837 Muskingum College.....J. Knox Montgomery, Jr., B.A.
 1838 Duke University.....David M. Harrison, B.Sc., M.A., Ph.D.
 1839 Boston University.....Francis Gerald Ensley, S.T.B., Ph.D., D.D.
 1839 University of Missouri.....Frederick Arnold Middlebush, A.B., A.M., Ph.D., LL.D.
 1842 The Citadel.....Judson Hair Sanders, B.Sc., M.Sc.
 1842 Ohio Wesleyan University.....C. E. Ficken, B.A., M.A., LL.B., LL.D.

1845	Baldwin-Wallace College.....	John Milton Blocher, Jr., Ph.D.
1845	United States Naval Academy.....	Donald F. McLean, B.Sc.
1845	Wittenberg College.....	Wendell C. Nystrom, A.B., A.M., Ph.D.
1846	Beloit College.....	James Burton Gage, B.A.
1846	Carroll College.....	Nelson Vance Russell, A.B., M.A., Ph.D.
1846	Mount Union College.....	Melvin W. Hyde, A.B., A.M., Ph.D.
1847	State University of Iowa.....	Jay N. Edmondson, B.S. in A.S., Mech. Engr.
1847	Otterbein College.....	John Gordon Howard, A.B., B.D., M.A., D.D.
1848	University of Wisconsin.....	James Kenneth Little, A.B., M.S., Ph.D.
1849	Syracuse University.....	J. Carlton Atherton
1849	William Jewell College.....	Emile Emdon Watson, B.A., M.A., LL.D., Hon.Ph.D.
1850	Heidelberg College.....	Frederick Daniel Lemke, A.B., A.M., Ph.D.
1850	University of Utah.....	A. Ray Olpin, A.B., Ph.D.
1850	Capital University.....	Harold Leland Yochum, M.A., D.D.
1850	University of Dayton.....	George J. Renneker, M.A., Ed.D.
1850	Hiram College.....	Paul H. Fall, A.B., M.A., Ph.D., LL.D.
1851	Northwestern University.....	Richard Paul Trenbeth, B.Sc.
1851	University of Minnesota.....	James Lewis Morrill, A.B., LL.D.
1853	University of Florida.....	Roy Edward Tew, B.A.E.
1853	Western College for Women.....	Mrs. Grace Stevenson Haber, B.A., M.A.
1855	Michigan State College.....	William Hobart Combs, B.A., M.A., Ph.D.
1855	Pennsylvania State College.....	Charles Grover McBride, B.S., M.S., Ph.D.
1856	Lake Erie College.....	Clarence Shute, Ph.D.
1856	Monmouth College.....	Leslie Mountford, A.B., D.D.
1857	Florida State University.....	Ernest W. Cason, M.A.
1858	Iowa State College.....	Harold Vincent Gaskill, B.A., M.A., Ph.D.
1860	Wheaton College (Illinois).....	Alfred C. Eckert, Jr., B.S., Ph.D.
1861	Massachusetts Institute of Technology.....	Clarence Earl Richards, B.Ph., B.Sc.
1863	Kansas State College of Agriculture and Applied Science	Charles Julius Willard, B.Sc., B.Sc.Agr., M.Sc., Ph.D.
1863	University of Massachusetts.....	L. S. Woodworth, B.Sc., M.D.
1865	Cornell University.....	Frank Cary Caldwell, A.B., M.E. in E.E.
1865	University of Kentucky.....	Philip B. Hardymon, B.A.
1865	Vassar College.....	Lois Boyd Hanaford, A.B.
1866	Carleton College.....	Rebecca S. Marble, B.A.
1866	College of Wooster.....	John DeWitt McKee, Ph.B., M.A.
1866	University of New Hampshire.....	John I. Falconer, Ph.D.
1867	University of Illinois.....	William Littell Everitt, E.E., M.Sc., Ph.D.
1868	Oregon State College.....	Le Velle Wood, B.Sc., M.Sc.
1868	Wayne University.....	Arthur Henry Smith, B.Sc., M.Sc., Ph.D.
1869	Pennsylvania College for Women.....	Katherine Rhys Reebel, B.A., M.A., M.S.S.
1869	Purdue University.....	Frank C. Hockema, B.Sc. in Mech. Eng., M.Sc. in Mech. Eng., Ed.D.
1869	Wilson College.....	Eleanor C. Adams, A.B.
1870	University of Akron.....	Hezzleton E. Simmons, Sc.D., LL.D.
1871	Agricultural and Mechanical College of Texas.....	William Ross Irvin
1872	Alabama Polytechnic Institute.....	James W. Edwards, B.Sc.
1872	University of Toledo.....	Wilbur Wallace White, Ph.D.
1873	Drury College.....	Mrs. Norma Pfister Albaugh, A.B., M.A.
1873	Rose Polytechnic Institute....	Harry Adolph Schwartz, B.Sc., M.Sc., M.E., Ch.E., Sc.D., D. Eng.
1874	Colorado College.....	Kinzie B. Neff, B.A.
1874	University of Nevada.....	George H. Ladd, B.Sc. in Mech. Eng.
1875	Smith College.....	Mrs. Harold H. Buell, A.B.

THE DELEGATES FROM SOCIETIES AND ASSOCIATIONS FOR THE ADVANCEMENT OF LEARNING

In Alphabetical Order

- American Association for the Advancement of Science
Frank Leslie Campbell, B.Sc. in Ch.E., M.Sc., D.Sc.
- American Association of Collegiate Registrars... Ronald B. Thompson, B.A., M.A., Ph.D.
- American Association of Collegiate Schools of Business
Russell Alger Stevenson, B.A., M.A., Ph.D., LL.D.
- American Association for Health, Physical Education, and Recreation
Paul E. Landis, B.Sc., M.A.
- American Association of Land-Grant Colleges and Universities
James Lewis Morrill, A.B., LL.D.
- American Chemical Society..... William McPherson, B.Sc., M.Sc., LL.D., Ph.D.
- American Council on Education..... Raymond Walters, M.A., Litt.D., D.H.L., LL.D.
- American Economic Association..... Albert Benedict Wolfe, A.B., A.M., Ph.D.
- American Historical Association..... Walter F. Dorn, Ph.D.
- American Home Economics Association..... Vivian M. Roberts, B.Sc., M.Sc., Ph.D.
- American Institute of Mining and Metallurgical Engineers.... Clyde Williams, B.Sc., D.Sc.
- American Library Association..... Walter T. Brahm, A.B., B.S. in L.S.
- American Mathematical Society..... Charles Napoleon Moore, A.B., M.Sc., Ph.D., Sc.D.
- American Optometric Association..... John B. O'Shea, O.D.
- American Philological Association..... Kenneth Morgan Abbott, Ph.D.
- American Philosophical Association..... Albert E. Avey, A.B., A.M., Ph.D.
- American Physical Society..... Harold Herborg Nielsen, B.Sc., A.M., Ph.D.
- American Political Science Association..... Henry Russell Spencer, A.B., A.M., Ph.D.
- American Society of Civil Engineers..... Clyde T. Morris, C.E.
- American Society for Engineering Education..... Clement Joseph Freund, A.B., M.E.
- American Society of Mechanical Engineers..... Samuel R. Beitler, B.M.E., M.E.
- American Veterinary Medical Association..... Walter R. Krill, B.Sc., D.V.M.
- Association of American Colleges..... Kenneth Irving Brown, Ph.D., LL.D.
- Battelle Memorial Institute..... Clyde Williams, B.Sc., D.Sc.
- Botanical Society of America, Inc..... William Campbell Steere, Ph.D.
- Engineers' Council for Professional Development
Ivan Charles Crawford, B.S. (C.E.), C.E., Sc.D.
- Geological Society of America..... John Lyon Rich, A.B., A.M., Ph.D.
- National Association of Deans of Women... Mrs. Christine Yerges Conaway, B.A., M.A.
- National Association of State Universities
Frederick Arnold Middlebush, A.B., A.M., Ph.D., LL.D.
- North Central Association of Colleges and Secondary Schools
Bland Lloyd Stradley, B.A., D.Ed.
- Ohio College Association..... Hezzeleton Simmons, Sc.D., LL.D.
- Ohio State Archaeological and Historical Society..... Erwin C. Zepp, B.L.A.
- Smithsonian Institution..... Matthew Williams Stirling, B.A., D.Sc.

REPRESENTATIVES OF STUDENT ORGANIZATIONS

In Alphabetical Order

Alpha Lambda Delta.....	Janet Eileen Monahan
Bucket and Dipper.....	Willis Kellen Link
Chimes.....	Betty Jane Southard
Civitas.....	William Franklin Donnelly
Cosmopolitan Club.....	Alexander Grobman
Council of Fraternity Presidents.....	Charles D. Byrd
Military Council.....	Thomas William Feick
Mortar Board.....	Martha Ann Beha
Ohio State Lantern.....	Lee R. Adams
Ohio State University Y.M.C.A.....	Russell W. Miller
Ohio State Y.W.C.A.....	Mildred Ellen Clodfelter
Pharmacy College Council.....	Nancy Ann Ruff
Pleiades.....	Margery Jean Beazley
Phi Eta Sigma.....	Myron Teitelbaum
Sphinx.....	David H. King
Student Council of the College of Arts and Sciences.....	Lawrence Rapport Robinson
Student Council for Religious Affairs.....	Williams O. Hoover, Jr.
Student Senate.....	Leslie Rudisill Forney, Jr.
The Engineers Council.....	Charles Wilson, Jr.
University House Assembly.....	Bessie Mae Ring
Women's Self Government Association.....	S. Elaine Thomas



MAJOR GENERAL A. C. McAULIFFE
U. S. Army General Staff



EDGAR C. BAIN, Vice President
Research and Technology
Carnegie-Illinois Steel Corporation



HUGH S. TAYLOR
Dean of the Graduate School,
Princeton University



ALPHEUS W. SMITH, President
The Ohio State University
Research Foundation

PART II

THE PROGRAM SPONSORED BY
THE OHIO STATE UNIVERSITY
RESEARCH FOUNDATION

November 4, 1948
Hagerty Hall Auditorium

Theme: RESEARCH—A HUMAN RESOURCE

Chairman:

HOWARD L. BEVIS, President, The Ohio State University

Speakers:

MAJOR GENERAL A. C. McAULIFFE, Deputy Director for Research
and Development, Army General Staff

EDGAR C. BAIN, Vice-President, Research and Technology, Carnegie-
Illinois Steel Corporation

HUGH S. TAYLOR, Dean, Graduate School, Princeton University

OPENING REMARKS

By HOWARD L. BEVIS

THE Ohio State University is celebrating its seventy-fifth anniversary this year. This evening's meeting constitutes the second major event on our calendar of activities commemorating this anniversary. It has been arranged by The Ohio State University Research Foundation as a part of its twelfth annual meeting.

The function of the Research Foundation is to organize, in cooperation with industry and government, and to administer under contract, research projects which not only are of sufficient potential value to the sponsoring organization to merit its support, but are also of definite interest to the University and to the members of its staff. These projects are carried out in university laboratories under the supervision of qualified and interested members of the faculty. They are integrated with the regular university program of instruction and research in such a way that, in addition to the full-time scientific personnel who are utilized in these sponsored researches, a large number of graduate students receive valuable supplemental training and practical research experience by participating in them.

Although the Research Foundation was established only twelve years ago, it now numbers in its co-operative research program approximately one hundred currently active projects being carried out in twenty-five departments of the University under the sponsorship of industrial firms and associations, and several of the major divisions of the federal government. Through these Research Foundation projects a closer relationship is promoted between the University and industry, and between the University and various branches of our national government. By this means the University is enabled to participate more fully in scientific and technical progress and in the bettering of our public welfare.

The value of this program to the co-operating organizations in terms of scientific and technical results is perhaps best shown by the tremendous growth of the Foundation's activities during the twelve years of its existence. From this program there has resulted a steady

flow of graduates who have had practical research experience while still attending the University, and who are thus fitted to step more immediately into responsible scientific and technical positions upon their graduation. Furthermore, the scientific and technical results of the research programs themselves have, through publications and through application in the laboratories of the sponsoring organizations, demonstrated beyond question the value and the significance of our theme for this evening, "Research—a Human Resource."

The program of the Research Foundation involves co-operation of government, industry, and the University. This pattern is typical of the over-all scientific program of the nation, in which the dominant roles are similarly played by government, by industry, and by universities and other non-profit research institutions. It is fitting, therefore, that in this program the points of view of these three major types of organizations toward research and its place in the development of our human relations should be represented.

We are particularly fortunate to have with us this evening as spokesman for the government Major General A. C. McAuliffe, who has had a distinguished career, not only in active military service, but also in the research and development programs of the Armed Forces. He first attended West Virginia University and subsequently became a graduate of the United States Military Academy, the Field Artillery School, the Command and General Staff School, and the Army War College. Early in the recent war he joined the 101st Airborne Division. During the Normandy invasion he parachuted into France, and in the airborne invasion of Holland he commanded the Glider Echelon. In January, 1946, he became Ground Forces Adviser to Admiral Blandy, Commander of Joint Army-Navy Task Force One for Operation Crossroads, and served at Bikini throughout the atomic-bomb tests. In August, 1946, he returned to the United States to become Army Secretary of the Joint Research and Development Board, a position which he held until January of this year when he was appointed Chief of the Research and Development Group of the General Staff, United States Army. He also serves as a member of the Research and Development Board, which has the over-all responsibility of co-ordinating the research and development program of the National Military Estab-

lishment. General McAuliffe will speak to us on "Military Research in the University."

We are especially pleased to have Edgar C. Bain as our speaker on behalf of industry. He not only occupies an important position in industrial research but also is an alumnus of this University and an Advisory Member of the Research Foundation. A native of Ohio, he received his Bachelor's and Master's degrees, as well as his professional degree, in chemical engineering from this University. During the first World War he was commissioned in the Chemical Warfare Service, after which he began his distinguished work in the field of metallurgy. This has included pioneering in the use of X-rays for the study of crystal structure and intensive study of alloy steels. In 1943 he was appointed to his present position as Vice-President in charge of Research and Technology of the Carnegie-Illinois Steel Corporation. For his outstanding contributions to the development of metallurgy, he has been awarded many honors, including the Benjamin Lamme Gold Medal and the Albert Sauveur Achievement Award. In addition, he is active in the affairs of many scientific and engineering societies, being a past president of the American Society for Metals and at the present time chairman of the General Research Committee of the American Iron and Steel Institute. He has been awarded the honorary degrees of Doctor of Engineering by Lehigh University and Doctor of Science by The Ohio State University. Mr. Bain will address us on the subject, "The Functions of Industrial Research."

The final speaker on our program is Hugh S. Taylor, who is eminently fitted to present the university point of view. A native of England, he was educated principally at Liverpool University where, following advanced work also at the Nobel Institute of Stockholm and the *Technische Hochschule* at Hanover, he received the degree of Doctor of Science in 1914. In that same year he came to the United States and became instructor in chemistry at Princeton University, where he has advanced to his present position of Chairman of the Department of Chemistry and David B. Jones Professor of Chemistry. He was active in both World Wars, as a member of the British Munitions Inventions Department in the first war, and in the recent war successively as liaison officer between Canadian and American science,

as director of a research project on heavy-water production, and finally as associate director of the SAM Laboratories at Columbia University. Thus he played an essential part in promoting the development of the atomic bomb, which General McAuliffe and his group later tested at Bikini, and he also has had extensive participation with research in industry. He has been a distinguished contributor to the fields of catalysis, photochemistry, and the mechanisms of chemical reactions. In recognition of his outstanding work he has received many medals, including the Nichols Medal of the American Chemical Society and the Longstaff Medal of the Chemical Society of London. He has also been awarded the honorary degree of Doctor of Science by the University of Louvain, Rutgers University, Boston College, Laval University, and Case Institute of Technology, and the LL.D. degree by Providence College. It is a baffling thing to understand how this man has still found the time to serve as Dean of the Graduate School at Princeton University, a position to which he was appointed in 1945. Mr. Taylor will speak to us on "The Role of University Research."

MILITARY RESEARCH IN THE UNIVERSITY

By MAJOR GENERAL A. C. McAULIFFE

I WANT to thank you for the honor which you have extended to me of participating in your Diamond Jubilee Anniversary celebration of the founding of this great University. It is a pleasure to have the opportunity of becoming better acquainted with your institution, your Foundation, faculty and officials, and of discussing with you tonight some of the aspects of "Military Research in the University."

It is interesting to trace the history of Ohio, the first state to be carved out of the original Northwest Territory, and note how you have continued to lead, down through the years, in carrying out one of the most important provisions of the Northwest Ordinance, namely, that "knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall [within its boundaries] forever be encouraged." Unhappily, we are today having to place more emphasis on the good government part of this provision in the form of military preparedness, whereas we might better be placing our emphasis on the "happiness of mankind." The international power game into which we have been forced makes it mandatory for our very survival as a free and independent state that we lead in world scientific and technological developments.

The seventy-five years since the founding of The Ohio State University as a land-grant state university have been marked by your phenomenal growth to become the fourth largest educational institution in the nation with a student body of approximately 25,000, and by your outstanding contributions and invaluable service to the people of the state of Ohio and the nation. We, in the Armed Forces, are especially indebted to you for your splendid co-operation and assistance during the past war, and for your continuing interest and support of our postwar research and development program. You have provided us with that valuable asset which no money can buy: human resources—scientific brain power and the engineering skills to exploit it. Regardless of how rich a country may be in natural resources, it is this human element that is responsible for technological progress.

Next to this important contribution of scientific brain power and engineering skills, we also look to you for basic and fundamental knowledge concerning the laws of nature. This knowledge, properly interpreted and applied, can enable us to equip our Armed Forces with unquestionably superior weapons and techniques and assure us the strong national position in industrial technology which, in the last analysis, is the backbone of our national security.

I want to commend particularly the foresight and vision of your university officials and faculty in setting up The Ohio State University Research Foundation twelve years ago, thereby enabling this institution through a fortunate combination of time and circumstances to make one of the largest and most valuable university contributions to urgent and vital wartime research and development. The groundwork laid by your Foundation in the less hurried days of 1937 for the purpose of integrating, organizing, and administering sponsored research at Ohio State, enabled you to handle the enormous military research and development program suddenly required of you during the war much more smoothly and adequately than would have otherwise been possible.

This greatly increased use of university research capabilities by the government and by industry will, from all indications, continue. The idea of government-sponsored research in the universities is not new. It dates back to the passage of the Hatch Act in 1887 by Congress, providing for federal grants-in-aid for agricultural experiment stations in the land-grant college system. This rather haphazard government-sponsored research produced some helpful results in World War I, and brought to the fore the importance of colleges as research centers, as well as their lack of organization in some cases for managing such research. While government-sponsored research prior to World War II was measured in thousands of dollars, it is today measured in millions, and university foundations such as yours, or similar special divisions in the universities, are necessary to handle adequately the costly programs and insure full co-operation and participation on the part of government, industry, and the educational institutions of the country.

As the spokesman for the government this evening, I should like to call your attention briefly to the present magnitude, scope, and

goals of government research generally. This situation was thoroughly covered last year by John R. Steelman, chairman of the President's Scientific Research Board, in his five-volume report to the President, with which I am sure you are all familiar. There is hardly a field in either the physical or the social sciences in which governmental research is not now carried on. With few exceptions, this research is along applied or developmental lines, although basic research is conducted in agriculture, aeronautics, synthetic-fuel studies, and atomic energy, to name a few instances where it is essential.

The goals that justify the expenditure of a fairly large portion of the taxpayer's dollar for research and the consequent diversion of many scientists, engineers, and facilities from private pursuits can best be summed up in the clear and simple statement in the Preamble of the Constitution which directs the government of the United States to "provide for the common defence, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity." Specific goals are worked out by agencies in the government and by officials who are appointed to their positions or who are elected to office by the people of the country. During peacetime, the research facilities in government agencies demonstrated their usefulness as a service to the well-being of the country, and during the war years they proved their worth and vital importance in solving some defense research problems. In most instances, this demanded the dropping of basic investigations in favor of applied research and development, the same situation that prevailed in the majority of the country's industrial and nonprofit laboratories. The effects of federal research and development programs are felt in every area of our national life. The National Bureau of Standards, the Civil Aeronautics Authority, the Army Quartermaster Corps and Medical Department, the Departments of Agriculture and Interior, the Bureau of Mines, and others all set standards and specifications which are followed by private organizations throughout the country.

Because of the necessarily large expenditures at the present time for military research and development, there has been considerable severe criticism of the so-called "militarization of science." A solution to this problem has been offered by Mr. Steelman. One of his recom-

mendations for co-ordinating all government research has been acted upon by the President in setting up the Interdepartmental Committee for Research and Development, on which Committee I sit as Department of the Army representative. It is hoped that Mr. Steelman's other recommendation to serve this same purpose for all our national research and development in government, in industry, and in the universities and nonprofit foundations in some form of a National Science Foundation will be acted upon by the next Congress. As conceived by Vannevar Bush, at the request of the late President Roosevelt, this National Science Foundation would serve as an over-all co-ordinating and evaluating agency for national research and development, and provide much needed encouragement for the development of future scientific talent at the higher levels of education.

All the elements of the nation's effort toward national security and prosperity require policy direction. In the Armed Services we now have the Research and Development Board to serve this purpose as far as research and development in the National Military Establishment are concerned. Undoubtedly, one of the most important accomplishments resulting from the establishment of the RDB is the arrangement by which outstanding civilian scientists and technical men sit with the military and actually vote on major policy decisions affecting military research and development activities. When the three military branches do not agree, the civilian membership, in many cases, is sufficient to swing the committee or panel vote one way or the other. The majority of these civilian members are obtained on loan from educational institutions. Among them I have in mind Mr. Owens, member of the Infrared Panel of the Committee on Electronics, and Mr. Crawford, Chairman of the Committee on Ordnance, both of whom are members of your Foundation. In addition, when Mr. Bush, Chairman of the Research and Development Board, was recently forced to relinquish his task, the military looked to the universities and obtained Karl Compton, President of Massachusetts Institute of Technology, to replace him as chairman. Others not holding permanent membership on the Board are helpful in lending their assistance from time to time.

Unfortunately, there is no similar agency for the co-ordination of

all the research and development in the country, or even all of the governmental research and development, as the Interdepartmental Committee acts only in an advisory capacity. Our national research and development effort consequently lacks what might be termed "program research." This term covers background and exploratory research in broad fields to determine what areas of further research will be most profitable in the interest of promoting our national welfare and security. By its very nature, such research can only be instigated at the highest government level.

The cost of modern research and development is fabulously high and is increasing as technology becomes more complicated. Where most of the cost of research in the past has been borne by industry and private philanthropists, the burden of financial responsibility now rests upon the government and the taxpayers. It will always be a problem to persuade the taxpayer that the cost is a necessary expenditure. There is a question right now as to whether this or any other country's economy can support the cost of the sustained conflict which might utilize, for example, some of the extremely expensive weapons of the often predicted "push-button" warfare of the future even if we can develop them. Because of the necessity of holding costs down, and fully evaluating the end results of our efforts, it is essential that our research and development programs in this country be subjected to alert review in order to preclude the possibility of producing end items unrealistic with respect to the capabilities of the nation's economy.

Besides co-ordinating research and development, another important purpose that this proposed National Science Foundation could serve would be as a powerful aid in providing the necessary personnel for an adequate national research and development program. Science has advanced to the point where all the areas from idea conception, efficient administration, on through to equipment operations, require many and different types of trained technical personnel. If any type of personnel is slighted, the chain of practical adaptability of science is liable to fail. Expansion of trained personnel has not kept pace with research and development budgets. Many of the students in training at the beginning of World War II were withdrawn to support the war in other directions, as a result of what I consider to be a short-sighted

policy in the matter of Selective Service. The scientists, technicians, and engineers employed in government, industrial, and educational laboratories now comprise less than one-half of one per cent of our population. A great majority of these are technicians and engineers. Those actually engaged in scientific research are less than one-sixth of even this small percentage. That the nation will require in a future emergency more scientists and technicians than are available today is a foregone conclusion.

One of the military's most pressing problems in connection with the civilian world is in obtaining a sufficient number of qualified scientific personnel to man our government staffs and laboratories. This is a particularly trying problem to us in the military who are trying to recruit highly qualified scientific personnel in competition with the other military departments and with industry and the university. We are not able to pay the salaries of industry nor are we able to provide the atmosphere or the environment that scientists find on the campus. I hope you will think that we have made some gains in this field. We have certainly tried hard both in the direction of salary and in improved environment for scientists working for the government.

Some of the steps we have taken in finding an answer to this problem have been to contact the leading scientific and engineering societies and arrange with them to form standing committees to act as liaison agencies with the Army in matters of mutual interest. This is likewise done by the Navy and Air Force, of course. In the Army we have a program of graduate study for Regular officers who possess special qualifications in science and engineering. The program covers about one thousand officers in 95 schools throughout the country. After graduation they will serve as administrators of Army research laboratories, proving grounds, or headquarters offices. Actually, there are several of these officers who are taking courses here at Ohio State. We have a Reserve officer program in which we form research and development groups of civilian scientists holding Reserve commissions. They work on Army research and development problems during peacetime and will have mobilization assignments that will make them available for technical work in case of emergency.

FINALLY, much of our research and development work is done under contract with outside facilities. The National Military Establishment is the largest contracting agency in the country. I shall conclude with some of the problems involved in carrying out its program as far as the universities are concerned as well as some of the advantages I believe there are to be gained.

Of equal importance to an increased number of scientists and technicians is an increased amount of basic and fundamental knowledge on which to build new developments. According to the Steelman Report, approximately \$35,000,000 is being spent by the government on fundamental research in the educational and nonprofit research institutions of the country, and Mr. Steelman suggests that this amount should be quadrupled in the next decade.

In letting research contracts to universities, we of the military try constantly to bear in mind the fact that the university is first and foremost a seat of learning. Research contracts cannot be allowed to divert the scientists on your faculty and limit their teaching, thereby lowering the quality of instruction. The efficient functioning of such groups as your Research Foundation can successfully avoid this error by adapting government research programs to academic and educational objectives of the university, with consequent benefit to both the government and the university.

Criticism of the government in general, and of the military in particular, both as employers of scientists and as sponsors of scientific research contracts, has been largely directed at statutes, regulations, and policies governing their activities in these roles. In an effort to improve our Army research and development contract procedures, last spring we asked Robert Stewart, Vice-President of Purdue University, to head an Advisory Committee on Contractual and Administrative Procedures and, after studying present procedures, to recommend improvements. A report has not been officially submitted to Secretary Royall or me as yet, but I have seen preliminary drafts. The Committee was composed of executives and contract administrators from a number of our universities and industrial organizations and private research institutes. I should like to tell you now some of the proposals that the group has made.

The Committee suggested that in selecting competent contractors for research and development in the Army, contracting officers should consider: (1) the desirability of spreading research and development as widely as possible and encouraging small and new organizations which have good qualifications in particular fields; (2) the personnel available, including their experience and their research and development qualifications; and (3) the qualifications of the organization (including management, financial responsibility, and equipment and space necessary for the work), the previous experience and performance of the proposed contractor in the same or related fields, and the price or cost estimated to accomplish the proposed work.

It was proposed by the Committee that each technical service within the military should handle research and development contracts through one individual with rank and authority commensurate with his responsibility and that of the contractor's representative with whom he is to deal. The contracting officer should have complete control over all aspects of relations with the contractor (except where an independent audit is indicated). An independent audit should be limited to a verification of the contractor's statements of cost and should not include approval or disapproval of items of cost. Sound principles of organization include the consolidation of authority with responsibility, clean lines for the delegation of authority and responsibility, and a recognition of the fact that administration is primarily a service and a co-ordination function to facilitate rather than to control the actual work at an operational level. Violation of this principle, said the Committee, inevitably causes confusion, delays, and ineffectual operation.

In a governmental undertaking, where all of the details of what is done are open to public censure, it is only natural that there should be a tendency in the direction of controls which will prevent criticism, even if these controls cost more than perhaps will be saved. In a good Army research and development program we are sometimes forced to "stick our necks out," in order to put through programs which, while based on sound principles, cannot at the time be openly justified because of security restrictions, slowness in achieving results, and the like. It is an obligation of an institution contracting with the govern-

ment to point out and to implement, where possible, those changes in methods and procedures which promise a decrease in cost as compared with the value derived. Even in research and development contracts, the value to the military establishment of what is bought must be compared with its cost, although we recognize, of course, that in certain research and development contracts we can't win all the time and if we don't take chances we'll never get results. However, the use, or an implication of the use, of Army research and development contracts as an outright subsidy is neither justifiable nor desirable.

The Committee said that in time of peace, research and development work placed with educational institutions should be unclassified as far as possible. The Committee did not extend this recommendation to include research institutes associated with educational institutions where the research and development work is segregated from the normal academic instruction and research activities. It is particularly advisable that fundamental knowledge be widely circulated and that basic research contracts be kept unclassified. I might say that all government agencies are interested in this report of the Stewart Committee, since all have had problems and difficulties in the negotiating of research and development contracts. The only reason the present interdepartmental committee has not taken some action in this area before is that it is waiting until the Stewart report is formally presented.

General Eisenhower, while he was Chief of Staff, laid down the principle of separating research and development contracts from those for procurement of supplies and routine services, when he set up a separate General Staff division to handle research and development matters. In research and development contracts what the government is really buying is competence of individuals and organizations in fields in which it may reasonably be expected that the solution to a problem may be obtained. In addition to the scientists and technologists of an institution, it is important that correct evaluation be made of the financial and business administrators who constitute the other half of the team and, as such, are the invisible resources of the institution. By the very nature of governmental operations, the contractual relationship is bound to be more complicated than between private organizations. The fact that competent scientists and engineers whose

work is desired under contract are to be found in the university, and the competence of the university itself, are principally due to the educational environment as a fountainhead of learning; and military research contracts must not effect any modification of this environment or disturb normal university operations if the most efficient and effective results are to be obtained. The government and the university must both be ever aware of the fact that just because the money is available, certain fields of science are apt to be emphasized at the expense of others. We in the Army are now approaching the development stage of many of our weapons begun either during or shortly after the war, and this fact, combined with the seriousness of the international situation today, causes a tendency to divert money and attention from new fundamental knowledge to development projects of more immediate value to us. However, giving sole attention to the short-range point of view would be dangerous for the nation in the long run.

Finally, we can appreciate how averse you are to the danger of cancellation of large contracts before their completion. Such cancellation might leave you with long-term commitments in staff, facilities, and graduate students which would probably be financially and educationally embarrassing. Here, too, the problem of balance enters in; a research program that is well balanced between governmental and industrial sponsorship will offset this danger to a great degree. We shall be sacrificing the services of many competent institutions if we allow them to lose ground because of military contract obligations. In all nonprofit organizations, there must be an opportunity to recover costs and at the same time to advance the aims of these institutions.

LET US now consider some of the advantages of military-sponsored research in the university, which, in my opinion, far outweigh the problems I have just mentioned.

Military-sponsored research extends the service which the scientists and scholars of the country can make to the national welfare. We are able to obtain the services of men with the best brains and skills in the country in this fashion; otherwise they would be beyond our reach. By a system of contracts with you and the lending of scientists on your faculty to us on a rotation basis, we do not deprive you of their services.

Of outstanding advantage is the contribution which sponsored research is making toward the training of graduate science and engineering students. By providing expensive facilities and financial aid to graduate schools, the government research program is assisting the universities to meet the problem of enormous shortages of scientists and engineers which developed during the war years. That problem is being solved much more rapidly than had been thought possible at first.

Not only has this sponsored research increased the capacity for training advanced students, but in most instances it has improved the quality of their advanced education as far as actual practical experience and superior facilities are concerned. In the engineering fields, particularly, new dimensions to graduate training have been added by work on large and important government projects. The large-scale projects afford young men and women in the universities the opportunity to acquire research techniques which can be learned only through participating in organized team research. Following such training, students are more immediately useful to industry and government research laboratories than they could possibly be under the pre-war smaller-scale training methods, which depended more on theory than on actual practice.

Such sponsored research programs also help increase the output of future scientists and engineers by enabling universities to provide more and better equipment. In the past, a student working on his thesis had to spend much valuable time building his own equipment, frequently of a type that a competent technician should be hired to build. Not only is more adequate and more valuable equipment made possible through the financial aid found in sponsored research, but with the increasing expensiveness of scientific equipment and instrumentation, such items as cyclotrons and wind tunnels can often be obtained only with the help of outside funds.

The problem of military security and patents imposing restrictions on the publication and discussion of research results should not have to arise within the university. Only in cases of dire necessity should the university be asked to accept restricted research. Unfortunately, in a world in which freedom itself is in too many places at a premium,

science, too, must bear the burden of a certain amount of sensible and necessary security. Laxity in application may give the enemy the scientific advantages necessary to achieve victory; too stringent regulations, on the other hand, may prevent the continuous cross-fertilization of ideas so necessary to fruitful scientific effort, and the resulting slowing of progress and development might let us fall prey to an alert aggressor. The implications of atomic energy have made the need for security precautions apparent to all. In view of present international developments, we shall continue to disseminate basic scientific knowledge widely, but the military feel that increased protection must always be given to applied knowledge and technical information about equipment. We think that we should not take classification restrictions off end items and specific gadgets—in general, military weapons—which have been developed as a result of scientific knowledge.

The government, because it may be in a better position financially to deal with the university, should not attempt to interfere with the close and fruitful association between industry and the universities which has grown up through the years. This association has greatly strengthened our schools of science and engineering as well as the large industrial firms of the country. During the war one of the greatest assets we had was our highly developed industrial research mechanism and production capacity, which will continue to constitute a vital national resource.

I DO NOT think I need to point out to you the seriousness of the world situation today. Should we have to fight a war in the near future, we would in all probability have to fight it with only slightly improved versions of our World War II weapons. I am speaking now only of the Army, although I believe the same applies to the Navy and Air Force. Atomic explosives, radioactive materials, and chemical agents all give promise of results as military weapons on a scale many times greater than is possible with our conventional weapons, but their use has not been perfected, with the exception, of course, of the atomic bomb. When perfected and used, it is problematical as to whether the end results and the cost will justify their use.

It seems to me that our greatest defense lies in making our country

so strong militarily and economically through scientific and industrial supremacy that no aggressor nation will dare attack us for fear of instant retaliation, totally destroying its ability and will to continue fighting. Continued and intensive military research is, therefore, a paramount element in our national security. It requires the full support of all the citizens of this country, but particularly the support of those of you in the scientific and engineering segment of our population. We need your help in solving many problems that reach far beyond the military, but nevertheless have a direct bearing on the outcome of total war. There are problems regarding such matters as psychological and propaganda warfare which are being studied in our General Research Program; the various aspects of our arctic program designed to enable us to protect our northernmost boundaries; the weather and how it can be adapted to suit our purposes and not those of the enemy; the problem of our diminishing natural resources and scarcity of strategic materials with which to produce the weapons of war; and finally, better means of collecting and disseminating scientific information to avoid duplication of effort and to produce speedier results.

There is now widespread recognition by progressive military men of the effective role of scientists in conducting studies of the military applications of their findings. More and more you will see scientists becoming full-time partners on military staffs for peacetime defense planning. The striking contributions of scientists in such varied combat operations as the Battle of Britain, the anti-submarine warfare, the invasion of Normandy and similar invasions in the Pacific, the bombing of Germany and Japan—all make me predict that scientists will always be an important part of the staffs of field commanders in war. It's a sound, healthy arrangement and one that augurs well for our national security.

THE FUNCTIONS OF INDUSTRIAL RESEARCH

By E. C. BAIN

EVEN to those whose daily occupations are with scientific research, its myriad branches and its infinitude of fruits are a little bewildering at times. One is tempted to try simplifying the whole matter by tracing it all back to man's early primitive curiosity and his first faint ambition to "use his head" to save himself drudgery and discomfort. But there is a danger in simplification because it leads too enticingly into over-simplification. Somewhere, man acquired the mental device of logic, and then the objective method of accelerated learning; that is, the tentative hypothesis and the critical experiment to test it. These he found good and an enduring urge was upon him. Perhaps these steady creative drives, in part, have brought us all the way to this inquiry into the significance of research, and of industrial research in particular, in this seventy-fifth anniversary year at The Ohio State University.

However this may be, we are discussing a human activity which has molded the very pattern of our daily comings and goings, for ours is a society wherein industry, given technological guidance by industrial research, is a dominant social influence. The unparalleled standards of living for all in America support the premise that American industry has succeeded in its objective of producing more needed goods and services for less of the time and effort of all its citizens. If we could not arrive at this judgment, then the interest in industrial research would indeed be limited. If the premise is valid, then perhaps it is enough that industrial research is the technical reconnaissance branch of an agency which, in itself, fulfills great material needs of men.

Research in industry as presently organized was in its infancy in America at the turn of the century. In America, things seem naturally to grow to bigness, be they government, labor, education, agriculture, or industry. Industrial research itself is today an activity in which well over one hundred and twenty-five thousand persons are gainfully employed and for which American industry is probably spending nearly five hundred million dollars annually. This is, in any units, a

human force of such magnitude that its potentialities warrant careful guidance so that it will serve the people of the nation well. This guidance, in our competitive society, may ultimately be supplied in an unequivocal manner by the final authority, the consuming buyer.

Forty years ago we should have discussed industrial research in a mood of conjecture; depending upon our several temperaments, we might have been mildly skeptical or hopefully speculative, but almost certainly we should have been prophetically vague. At a conference held at that time we should probably have heard some stirring reports from a few young research organizations in America's most courageous industries. Returning visitors from Germany would have reported the amazing employment of thousands of exceedingly well-trained scientists in making discoveries of great usefulness in the chemical and metallurgical industries and in the manufacture of fine equipment and instruments. Mention would have been made of the hundreds of German graduate students and teachers sternly enthusiastic about their several researches. Before another decade, we were to become very well aware, indeed, of the industrial might of Germany based upon the utilization of scientific research by the German industries.

It was during World War I that the general public first began to read of research and to talk about it, and in a quite well-informed way. It scarcely need be recalled how almost everyone in America with background and aptitude for research was pressed into scientific service by the time of the Armistice in 1918; how we found potash for use where it was really needed, made sulphuric acid without lead plates, contrived creditable submarine detection devices, made optical glass, synthesized photographic and other complex chemicals hitherto purchased abroad. American industry had full proof that American scientists could achieve in a hurry when called upon; perhaps our scientists themselves were somewhat surprised at their own competence. The important point is that by 1920, industrial research was established here in three hundred laboratories employing about nine thousand people. In retrospect it seems that there was almost as much awe of research at that time as there was understanding of it, but it functioned well and grew continually until the depression years in the early thirties, when, even then, the retrenchments were less than might

have seemed justifiable. In two decades, 1920 to 1940, the number of industrial research establishments and the total employees increased over sevenfold. Since then the activity has almost doubled; and what achievements these latest years have brought forth!

There is not time here to give even a proper word of admiring appraisal in appreciation of the crowning research achievements of the recent great research teams of World War II who created radar and the proximity fuse, and finally exemplified Einstein's compact little equation $E = Mc^2$, but this time with an accompanying release of a reported 39 billion Btu per pound of fissionable fuel. And for a demonstration of scientific ingenuities assembled in one device the image orthicon of television deserves a prominent place.

WHILE the sciences have expanded tremendously since 1940 and the processes of research and invention have grown complicated, the objectives of industrial research can, nevertheless, be simply stated. In brief they are, for a large enterprise, about as follows: (1) to improve products and develop new ones for old and new markets; (2) to improve processes and equipment in respect to cost, safety and comfort of operators, hygiene, and work environment; (3) to select and adapt raw materials for conservation, and to offset depletion and deterioration of raw-material supply; (4) to assist in instrumentation, standardization, and quality control; (5) to aid customers in best utilizing the products; and (6) to provide training in technological matters. With great nicety Raymond Stevens, of A. D. Little, Inc., has put all this into a comprehensive definition:

Industrial research consists of organized and systematic search for new scientific facts and principles which may be applicable to the creation of new wealth and presupposes the employment of men educated in the various scientific disciplines.

Acceptable definitions have been set up for varieties of research ranging from basic, through fundamental, background, and applied, to development. Industrial research is emphatically "applied," but it employs them all; and perhaps it is not of controlling importance to discriminate closely among these overlapping categories. Nor is it necessarily a characteristic of the research itself, that someone in

industry may be anxiously awaiting the results to employ them in improved goods for sale.

A composite schematic sequence for a typical industrial research and development project in some industries might be summarized as follows:

1. A need for an improved product or process is perceived.
2. A domain of investigation appropriate to the problem is selected by research management and outlined as a quest for new knowledge instead of a commercial desire.
3. A group under responsible leadership is assigned to the project. (The project may be divided into more attackable parts.)
4. The existing knowledge is reviewed, the literature is critically read, and after individual preparation for a conference, the project is discussed and a first attack decided upon—but only the first.
5. Exploratory work is done in the laboratory to gain firsthand acquaintance if no tentative hypothesis is yet forthcoming.
6. When the tentative hypothesis is formulated, it is tested by critical experimentation.
7. The previous step is repeated and repeated as required.
8. The new knowledge is applied on a minimum scale of embodiment.
9. The pilot-plant scale is operated until successful operating probabilities are secured.
10. Finally, the research department transmits a report with the full functional specifications and recommendations to the manufacturing or other department concerned.

It is hardly necessary to point out that such an orderly sequence is rarely wholly followed. The exploratory period may be short or it may be very long. One person cannot constrain another to discover. In fundamental research work, the team principle, with groups of constant personnel make-up during the investigation, is generally very effective. Both the evolution of leadership and the technique of joined efforts are fostered by this method. Scientists, like almost all other people, dislike belonging to a losing team and they play to win.

ONE might infer from all this that the year 1900 marked the beginning of the application of science and the scientific methods to industry. This is, of course, not true. There were precursors to the research era, individuals who made notable contributions of science—

but essentially as individuals. Samuel Luther Dana, for example, in the first half of the nineteenth century had a real laboratory in which he studied the bleaching and dyeing of textiles with great practical profit. In this pre-research era the names of several stand out as pioneers in applying scientific techniques to industry: Fricke, a German chemist, hired by Carnegie for his blast furnaces; Benjamin Silliman at Yale, who distilled and fractionated petroleum; Charles B. Dudley, who gave up the teaching of science in a military school to join the staff of the Pennsylvania Railroad; Durfee, who examined chemically the materials entering the early converters of the Kelly or Bessemer type. Some of these men of inventive genius, just prior to the establishment of early modern research in industry, virtually created new industries out of their investigations; Eli Whitney, Robert Fulton, Elias Howe, Samuel F. B. Morse, Cyrus McCormick, John W. Hyatt, and Charles Goodyear are typical. The productive period of some of these American geniuses who, almost single-handed, founded industries, extended well into the new research era. Names which typify the connection of the older era of the individual with the new organized system of industrial research include: E. G. Acheson, the discoverer of silicon carbide and a process of graphitizing carbon; Charles M. Hall, who electroplated aluminum; and Leo H. Baekeland, who improved the process of making a phenolformaldehyde resin.

Seventy-five years ago the principal source of science was the university or college, and clearly the great industrial era could not have flourished until a sufficient number of men were scientifically trained to supply the new technologies required in the great period of competitive industrial expansion. Between 1845 and 1870, Sheffield Scientific School at Yale, Columbia School of Mines, Worcester Polytechnic Institute, and the Massachusetts Institute of Technology were established, the latter, in part, "to meet the more limited aims of such as desire a scientific preparation for special industrial pursuits . . . having their foundations in the exact sciences." The great boon to scientific (and other) education was the Morrill, or Land-Grant Act of 1862. Purdue University, Pennsylvania State College, the state universities of Illinois and of Ohio are among those organized under that Act which became great universities. The purpose of these institutions was clearly stated by Andrew D. White in 1874: "It was to provide

fully for an industrial, scientific and general education suited to our land and time—an education in which scientific and industrial studies should be knit into its very core. . . .”

ALTHOUGH the scientific schools of Europe were flourishing earlier, America has taken the leadership now and the objectives of the founders seem to have been abundantly realized. Many schools were established and endowed by private contributions, but this source of support is rapidly drying up. Means for the training of men for research who have aptitude and the necessary determination must be provided if we are to maintain our technological position in keeping with the requirements of today. An idea of those requirements has been set up by the President's Scientific Research Board; in the report by the chairman, John R. Steelman, it is estimated that the nation's research bill for 1947 was \$1,160,000,000, over half of which was paid by the federal government and some 40 per cent by industry. This board recommends doubling this expenditure by 1957, or, in any event, the expenditure of not less than 1 per cent of the national income each year for all research.

All factions seem to be agreed that certain domains of the public welfare must look to the government, national or state, for active support of, and participation in, the needed research. The national defense, pre-eminently, and also the improvement of agriculture and the public health, the establishment of standards of measurements and the applicable methods therefor, are in their nature peculiarly constituted for governmental research. Valuable background research, as an accompaniment, has been well accomplished also in government institutions. Any vast, emergency investigations, should they become imperative, which are beyond the financial scope of industries or even groups of industries, would of necessity be sponsored by the government with taxpayers' money. Because of the peculiar and unique nature of the materials and the need for secrecy, it is understandably desirable that considerable parts of the research for defense be carried out in government-owned and operated facilities.

As for the responsibilities which fall to industry, it is agreed that industrial research is at an unprecedented level, and that it is desirable that such research be not reduced in effectiveness. The Steelman Re-

port states: "Together with advances in basic research, it provides one drive for an expanding economy and for a rising living standard for our people." The report further suggests in connection with the expansion in industrial research facilities: "We should provide a favorable climate for such expansion through tax incentives and other established methods, without making direct grants to industry." The competitive atmosphere of industry is tremendously stimulating to certain types of applied research and development, and its almost automatic yardstick of practical accomplishment makes it a vital and dependable aid to industrial progress. That is not to say that groups of competitive units of one industrial type may not, with advantage to everyone, co-operate in assigning some of the background research to well-adapted agencies for handling. They may still all compete aggressively on a market race-course which, through such joint effort, has been improved to better the performance of all the competitors.

It is not difficult, indeed it is usually singularly easy, to bring about full co-operation among research people. Any who have heard General L. H. Campbell, Jr., describe his Ordnance-Industry Team for Firepower, will recall that the Army regarded highly the co-operation shown in that team. There is no possible reason to imagine that anything but close co-operation in research could continue between industry and the National Military Establishment. Co-operation is at its best when it fosters mutual aid and prevents interference.

THIS leads us now to the central subject which has been implicit in much that we have covered. The universities have a critically important part in the nation's research program. From the universities must come the young scientists prepared to become competent research workers. To do the research job ahead, these university-trained men must continue to have great ability as well as to be sufficiently numerous. At the moment, in part because of the Veteran's Readjustment Act, they are probably being graduated in nearly as large numbers as are presently required in the physical and perhaps also in the biological sciences. For the universities to accomplish this task, certain favorable conditions should exist. It is, I believe, a reflection of the university opinion that the teaching staff should not be depleted to fill other needs. Furthermore, there is, I believe, general agreement that the

teachers of science should have frequent and close contact with the lively kinds of research, such as are fostered in industry and in the many research activities in the governmental domain. Only in some such way can the research point of view permeate the teaching of undergraduates and dominate sufficiently the postgraduate work. While most research and university people feel that education is the *raison d'être*, the business, of the university and the teaching staff, nevertheless, training for research is best accomplished in an environment where research is "in the very air." There appears to be a satisfactory solution now well established; for happily there has been a mutual advantage in the bringing by industries and government of a portion of their research work to the university, whose teachers may thereby better indoctrinate their advanced students in the prosecution of research. Teachers who do not do full-time teaching may do the best instructing of advanced students in science.

One source of such co-operative industrial research is the smaller industry with a narrower scope of science fields for which even a small laboratory of its own would be burdensomely large. Another source may be the marginal problems of a large industry which fall in a domain foreign to its principal technologies, but which are, none the less, highly important. Actually, many of the large industries with great experimental establishments are referring a substantial part of their work to university and other outside research institutions. Such "farming out" of research may possibly amount to as much as 10 per cent though no actual figures are available. In a general way the impression is created among the leaders of industrial research that the investigations made in the universities are of top-rank quality with a freshness of viewpoint not always secured within the industrial laboratories. Perhaps the industries ultimately gain almost as much through the indirect improvement in the training of their future employees as from the actual reports rendered by the university consultants. Grants-in-aid and contracts for work in definite directions are both desirable.

LEADERS of industrial research are not usually active teachers—they are not often experienced in pedagogy. Apparently, however, they are coming to believe that they now have some elementary notions,

at least, of the qualifications the college graduates should have for research careers. We may venture to guess a few of them. It seems that (1) they should be able to think habitually in a mathematical pattern, that is, mathematics should be an everyday tool, a practical aid to setting up hypotheses, not merely a matter of manipulations; (2) they should imagine quantitatively rather than descriptively; (3) if the graduates are chemists, they should also be well grounded in physics; (4) if they are physicists, they should have some facility in the disciplines of physical chemistry; (5) they need not have a wealth of detailed knowledge of any domain, but should be able quickly to acquire it. Perhaps, above all, one might say, they should greatly desire to do research competently, and if so, they will fulfill these requirements to meet their own high standards of performance.

And what, one may ask, are these research people to do? Some suggestions are immediately at hand. Now, while we learn to use substitutes, we may have to conserve some metals, the ores of which are not being found in quantities to maintain the reserves. Gradually, we shall have to learn to use even iron ores of inferior quality to produce steel of sustained quality; the sulphur content of metallurgical coke grows higher and higher. It is time to intensify the research on liquefaction of coal against the day when the petroleum supply, which so amazingly resists our enormous consumption, really begins to fail. Perhaps powdered coal is more usable directly than we now know. Soil for efficient agriculture must be enriched and maintained to feed a growing population. These are all largely matters for industrial research.

Men still feel they spend too much effort in building adequate housing for themselves. What a boon would be a really low-cost, low-maintenance house! We could use more basic materials of construction, tough and strong inside with aesthetically treated surfaces to resist moisture, sunshine, and heat. Transportation is amenable to improvement. In all these items we are still a long way from the field of "gadgets" which is so dear to Americans.

A wealth of new devices suggests the kind of unexpected aid to our researchers which may evolve to help solve the more difficult problems. A little piece of germanium and a bit of wire may replace a vacuum tube. A Krypton light flashes 3.3 billion candle power of

light for a few microseconds when triggered by an external voltage. We treat synthetic rubber at low temperature instead of the usual elevated temperature and avoid adverse reactions. Servo-mechanisms do half the control work in myriad operations, while we do counting, and even fantastically long mathematical manipulations, electronically. Wetting agents emulsify almost anything, including cutting oils; they help put out fires, beneficiate ores, degrease metal stampings, and aid in dust removal from air. Silicones make lubricants at once applicable to both high and low temperatures. Many of you are adding to this list. It would not appear that industrial research is in imminent danger of abandonment.

THERE is no basis for regarding the nation-wide employment of research as a trivial or even an obvious matter. Our hopes and assurances were high for a good world in the first decade of the century. By the attainment of objectivity, the subjugation of emotion and anxiety for self in the pursuit of science, we had begun an era of rapid understanding and control of more and more of the whole physical environment. We traveled a high road of aspiration. But the world could not escape two almost global armed clashes of hostile camps in three decades. Did these tragedies of aggression occur because Man is inherently incapable of dealing objectively with any questions touching upon his own individual or collective self? If not, can our social science soon break through to some new objective level in the comprehension of human relations, as epochal as was the era of steam or the nuclear denouement in the physical realm—in time, perhaps? Then we must be patient and to dare be patient we must be competent and technologically strong. Small as even the day-by-day advances in science and technology may seem by comparison with Man's central problem of peace, they are, nevertheless, the known approaches to strength, the things to be done now. The frontiers of technology can still be pushed to widening horizons. These things we know how to do, with the devices of organization and distributed responsibility; each group to do its task well, so as not to fail the others.

Where could we turn, if we would, but to the universities for the development of men of a stature to meet the incalculable problem of the preservation of Man's dignity?

THE ROLE OF UNIVERSITY RESEARCH

By HUGH S. TAYLOR

THE primary functions of a university are the training and education of students and the accumulation of knowledge. The university must be judged by the effectiveness with which it discharges these responsibilities. It requires for the task as intimate an association of the teacher-scholar with the student as can be achieved. The teacher can supply the background of accumulated knowledge, draw out from the student his latent potentialities to acquire such knowledge and to develop his critical faculties. As master and disciple they can essay the tasks of new scholarship, venture toward the yet unknown, until the disciple himself becomes the master.

In the years between two world wars there occurred in this country the fine flowering of this dual role of the university in the area of science, the intensification of the educational process, and the development of basic research in science. America was well served, when the stress came for the second time, by reason of that educational effort. The experience of World War I had shown that to meet the responsibilities of world leadership which victory in that war foreshadowed, it would be necessary for America to assume a larger share in the processes of higher education and of scholarship than was possible when the pioneers were opening up the continent. The extension of the frontier until it finally disappeared on the North American continent was achieved while still it was possible to live in relative isolation from the ancient strifes of the European continent, its wars and rumors of wars. American technical achievement in the airplane, however, had already provided the instrument whereby time and space could be annihilated, whereby isolation, remoteness from Europe's problems, was at an end.

It was a wise and far-sighted decision which in the early 1920's led the National Research Council to inaugurate a group of post-doctoral fellowships in mathematics, physics, chemistry, and the biological sciences. It was the objective of these fellowships to produce a group of research scientists who would, on completion of their train-

ing, return to the universities of the land there to reproduce their kind and thus, by a snowball effort, multiply rapidly the educational personnel to meet the demands in instruction and research which a call to world leadership would require. The co-operation of the universities and, at the same time, of the industries multiplied this effort still further by providing groups of graduate students who could participate in the research development, assisting both professors and National Research fellows. In their turn these graduate students passed either directly to industry for the enlargement of the research effort in applied science or, via the National Research Fellowships, to the reproduction process in the universities.

The fruits of that development were obvious during the 1930's and especially during the war years. The universities had built up a potential in scientific research which revealed its strength in the Nobel Prizes awarded to Urey, Anderson, Lawrence, Rabi, and Stanley, and other Americans, whose early training was assisted by the National Research Fellowships or their equivalent in other foundations. During the war years it was apparent that the distinguished leaders of the atomic-energy project were drawn in large measure from those scientists whose training in the 1920's had been assisted by national and international research fellowships, a further confirmation of these techniques of development for research. It is certain that, when the full record of the nuclear research effort is known, the contributions of American scientists to basic discoveries will be still more prominent and the rewards of those efforts will be recognized in the appropriate manner.

While this change has been occurring in the American scene, a corresponding retrogression has been occurring in areas of Western Europe. There, political action initially and then military activity have effectively reduced the opportunities for and the potential with which basic research can be prosecuted. The postwar conditions in much of Western Europe will inevitably result in a measurably smaller opportunity for basic research in an area which, hitherto, had been the most prolific source of such research in the nineteenth and twentieth centuries. On America is laid the responsibility in large measure to take up the task—to assume the obligation to replace the battered centers of

scientific research by new centers where the human values of enquiry, investigation, and discovery can be fostered and maintained.

Research in the universities must be directed toward the far horizon, not to the proximate issue. It should be concerned rather with the basic principles than with the technical application. In times of emergency all will be oriented to the solution of the urgent problems, but those solutions will be the more effective the greater the reserve of basic scientific capital. In the last decade we have, of necessity, been drawing so rapidly on accumulated reserves of scientific knowledge that the scientist's pressing problem today is one of renewal and rehabilitation. It must be recognized that the more comprehensive the reserves of basic scientific knowledge become the more rapidly can industry and technology discover the technical solution and its application to meet stated needs. When Einstein stated the equivalence of mass and energy in 1905 no one could foresee the atomic bomb. When Rutherford bombarded nitrogen with swift alpha particles in 1919 and released protons, the discovery could still be regarded as impractical. Even the discovery of the neutron and its application as a swift chargeless projectile with which to penetrate the hard core of even the heaviest atoms, as the researches of Fermi revealed, left the balance sheet of nuclear energy still overwhelmingly in the red. Nevertheless, this progression of "far-horizon" researches over thirty years provided a basic scientific capital which needed only the observation of nuclear fission by Hahn in 1939 to be rendered fruitful, and which led swiftly and speedily via the nuclear chain process to the atomic age and all the readjustments that this will involve, not only in science but also in human and social values.

This story of nuclear science is only the latest in an oft-repeated story which takes us back to the researches of Faraday and Henry, to Clerk Maxwell and Hertz, to Pasteur, to Roentgen, Becquerel, and the Curies for other variants of the same theme. Faraday, it is said, when asked by a lady the significance of his latest discovery replied, "Madame, what is the significance of a newborn babe?" To Mr. Gladstone, who queried the practical value of a new scientific fact, the reply was, "Perhaps, some day, Mr. Prime Minister, you will be able to tax it."

It is the particular obligation of the university to provide the capital of basic knowledge which society requires. To safeguard our educational inheritance we must maintain the freedom of the spirit to roam where it will. That is the basic freedom of the university scholar. The university constitutes an ideal environment for such a process. A group of scholars, with no immediate problems urgently to be solved, in association with a graduate student body, young, alert, vigorous, continually reproducing itself in the university environment, gives to this effort a character and a potential that other centers of research oftentimes lack. Is it significant, or is it perhaps attributable to the recent origins of the industrial research laboratory that, as yet, the major contributions in basic scientific research in large measure still stem from the university laboratories? Is this fertility in new science to be ascribed not only to the greater freedom of scientific enquiry that the university offers, but does it depend also in part on the constantly renewed sources of scholarly personnel in these areas? Is the stream of annual renewal which obtains in the university a life-giving stream which flows through the organism maintaining its vigor, its freshness, and its fertility? Certain it is that through the constantly renewed challenge of young minds the creative qualities of professors can be stimulated and maintained. Is it not true that, in the productive university research centers, the faculty draws rich stores of strength and inspiration from such sources, matches with such assets the competition by industry with larger financial facilities and superior technical equipment?

THERE is need for concern, however, that the balance between the university on the one hand and industry and government on the other, which is at all times a delicate balance, shall be maintained. There are present dangers that this balance may well be disturbed. There is a twofold threat which the events of the last decade have produced. One lies in a tendency to draw away too rapidly from the university its trained product. The other lies in the inability of non-profit organizations such as the universities, whether tax-supported or endowed, rapidly to adjust their economies to a rising spiral of prices, to the obvious facts of an inflationary period. This depletion of uni-

versity resources may even result not only in the loss of the trained product but also in the loss of those who produce such product. The realization of these possibilities must be the major concern of the best minds in the universities, in industry, and in government.

There is an easy, proximate solution of these present difficulties but we must ask ourselves whether it is the wise and long-range solution. Resources can be made quickly available to the universities in the form of grants for the solution of immediate problems of both industry and government. That solution, however, withdraws the gaze of the university scientist from the far horizon to the immediate details of the here and now. It can well result in the shrinking of the horizon and a narrower outlook for all—professor, industrial executive, and government official. It can indeed inhibit the basic freedom of the mind to roam, which is the proper function of the university scientist.

What, then, is the philosophy that should guide the university in its acceptance of research projects with industry and government? I think that the answer is twofold, one part negative, the other positive. The university should decide not to accept funds when they are to be used in solving a particular commercial problem involving the ordinary procedures of applied research or technology. It should tend to select research projects which involve fundamental science within the range of interest of its staff. Special consideration should be given to the possibility of integrating the research projects with the university's primary program of education. Selection of projects should be based on the intrinsic scientific worth of the effort. Thus, I believe that the university can safeguard its educational inheritance by giving due regard to the availability within the university of properly qualified and interested faculty members and the applicability of the research project as an instrument of education and instruction in the methods of science and scientific research.

This concern for balance and the temptation to the easy solution is receiving a marked amount of attention at the present time. The policies of the Office of Naval Research in the postwar years have definitely reflected these tendencies. Big business is becoming increasingly concerned with them. Laird Bell of Chicago has recently empha-

sized that "a great part of our national wealth is locked up in corporate form. . . . Some few of the advanced corporations already recognize that it is good business to promote higher education in its research aspects." "The next logical step," he states, "is to recognize an obligation to promote both theoretical research at the university level and the production of good citizens at the college level." The advanced position which these last phrases indicate is echoed also by Frank W. Abrams, Chairman of the Board of the Standard Oil Company (New Jersey): "If we let our educational system decay, we will gravely injure the foundation of our greatness as a nation. By the same token, if we develop our educational system—expanding it and making it stronger—we will be cultivating the greatest of our national resources, the people of America. And no one has a greater stake in the future of America than American businessmen."

IT is evident that, on a broad front, beyond even our present discussion of the conservation of our human resource, research, the problem of support from government and industry for the university is being examined. Our present more limited problem is to ascertain how the universities may best be assisted in "the stock-piling of basic knowledge." Some method must be found to provide a counter-balance to the distractions of applied research and tendencies of all kinds away from basic research. It is evident that industrial organizations can assist in promoting such programs of fundamental research. They can do so by the supply of funds which should, so far as possible, be unrestricted in use, the university to assume the responsibility of applying them in such a way as to produce most effectively a yield in fundamental knowledge. It ought not to be difficult to insure this and, at the same time, divest the research work so assisted of any suggestion of commercial objective.

A problem that arises in connection with such a proposal from the standpoint of a university is the period of time over which such a grant would be made available to the university in question. There are obvious difficulties in the operation of such a scheme on the basis of an annual grant. Basic research of this type requires long-range planning and commitments that will normally extend beyond one or

two years. The quality of personnel required cannot be secured on a year-to-year employment contract. For successful operation, basic research programs require personnel with at least the capacity of first-rate assistant professors. Such men expect and can secure term appointments of three years' duration. Any program of assistance by industrial organizations to universities for the promotion of basic research should envisage, therefore, the possibility of a grant to such a university over a period of years. A five-year period would represent a workable norm. One can visualize the possibility of a university entering into an arrangement of this kind with a group of industrial organizations, the periods of support to be staggered over the years in such a way that the discontinuance of one program of assistance would not seriously embarrass the over-all basic effort. As each five-year period terminated the university would make a comprehensive report to the industrial organization concerned as to what had been achieved with the assistance rendered and a statement as to what might further be achieved should the company decide to renew its commitment. Over a five-year period it should be possible for a university to demonstrate a proportionally larger achievement than it could possibly demonstrate on a year-to-year basis. The whole organization of a five-year project and its effective prosecution would be far superior to that possible on the basis of an annual grant.

To initiate such a program it might be necessary for an industry to proceed by stages. In the first year a five-year grant might be made to one-fifth of all the universities that were to be included in the over-all project of the company. In succeeding years grants to additional members of the university group would be initiated. In no year would the total expense or commitment be any larger than under a one-year scheme but the advantages of the longer-range project to each would be secured. It is well known that industrial organizations manifest reluctance toward long-range commitments because of their inability to anticipate what the future financial conditions will be. It may be urged, however, that since planning over a period of years ahead is a necessary part of executive planning for industrial objectives, it is equally necessary in planning for the accumulation of basic knowledge. Once this is recognized, the centers where basic knowledge is

accumulated can proceed to a more effective utilization of their assets in men and ideas.

PERHAPS it may be permitted, in conclusion, to turn away for a few moments from the concrete problems involved in the organization of basic research to the more abstract problem of research itself, research as a human resource. There came in this connection to my attention a few weeks ago a passage written by Pierre Teilhard de Chardin, the eminent Jesuit geologist, who has combined missionary and scientific activity in that fertile area for both, Northern China. Back in his native France in the autumn of a full life he has ventured to trace out the evolution of mind and thought as it envelops the earth. Concerning the development of research he penned the following passage which I have ventured freely to translate into English for this occasion:

To understand, to discern, to invent. . . . From the first awakening of reflective conscience, man surely has been possessed by the spirit of research. Until quite recently, however, this profound need remained, in the mass of humanity, latent, diffused or unorganized. In each generation, in the past, the true research workers, seekers by vocation or profession, have been recognized. But they have been only a handful of individuals, generally isolated, rather of an abnormal type—the group of “curious men.” Today, however, without our having paid particular attention to it, the situation is completely changed. By hundreds of thousands, at this moment, men in all directions of thought, life, and matter, are undertaking research, no longer alone, but by organized groups, endowed with a power of penetration that nothing seems to be able to arrest. Here also, the movement is in process of becoming generalized, it accelerates, to such an extent that one would have to be blind not to see in it an essential element. Manifestly, research, today still a luxury occupation, is in process of becoming a primary function, even a principal function of humanity. What does this great event signify?¹

Research, “by hundreds of thousands, by men in all directions of thought, life, and matter”—that is a canvas far larger, more comprehensive than that to which we have just been paying our attention. The research and scholarship that the university scientist pursues is

¹ “Une interprétation biologique plausible de l'Histoire Humaine: la formation de la ‘Noosphere.’ ” *Revue des Questions Scientifiques*, CXVIII (January, 1947), pp. 25–26.

not more than one-half of that which the university as a whole embraces. What of the professors and scholars in the areas of the social sciences and the humanities? They too have chosen the scholarly career, have elected their way of life with the same devotion to things of the mind and spirit that animates the best of the scientists. They too have made the sacrifices incident to a scholarly career, are also responsive to those stimuli that over the past decades have made the career of the scientist so fruitful. There is need, also, to secure to these men the same consolidation and unification of research effort, the same care for resources and support as are available to the scientist. Is it not possible to activate these disciplines with a measure of generosity similar to that which the scientist expects and receives?

America, today, faces a sterner task, a greater responsibility than one nation has ever faced before in the pages of human history. The task calls for constructive agencies even more than for destructive agencies. Besides the evolution of science we need also a revolution in man's mind and heart, his morals and his spirit. I see no way for university men to share in that revolution unless we face the task of research as a human resource at all the levels of thought, life, and matter, unless we face the task of increasing as well the contributions of teacher-scholars in those areas which science cannot serve. Thus, only, can we utilize to the full this function of research, this principal function of humanity.

